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FURTHER OBSERVATIONS RELATING TO MURRAY VALLEY ENCEPHALITIS IN THE NORTHERN TERRITORY OF AUSTRALIA.

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SERUM collected from aborigines in the Northern Territory of Australia during September and October, 1952, has been shown commonly to contain neutralizing and complement-fixing antibodies against Murray Valley encephalitis. Further, it was found that between 85% and 90% of specimens of serum collected at Port Keats on the coast, at Beswick Creek, about 50 miles east of Katherine, and at two neighbouring stations, Murray Downs and Elkedra, about 200 miles north of Alice Springs, contained such antibodies (Beech, Howes and Miles, 1953).

The National Health and Medical Research Council of Australia, therefore, has supported a further visit to the two last-mentioned areas, to make further and fuller investigations between October and December, 1954. For this expedition the mobile laboratory of the Institute of Medical and Veterinary Science, Adelaide, was used.

Materials and Methods.

Serum specimens were collected from aborigines at Beswick Creek Settlement, Murray Downs and Elkedra Stations. Serum from a few white men was also included. Serum was collected from fowls or Muscovy ducks, of known age, at Beswick Station (approximately 20 miles east from the settlement), at Murray Downs and at Elkedra. Serum from 19 goats was also collected at Beswick Creek Settlement.

Wild birds of some of the commoner species around these places were either trapped, bled from a wing vein and released, or, when we could not trap them, shot, and blood was promptly collected.

The blood was ordinarily left overnight and the supernatant serum was pipetted off next morning.

The serum specimens were stored at as low a temperature as we could hold in our refrigerator, which was not very efficient at the high temperatures encountered. When appropriate numbers of specimens had been collected they were packed in ice in a one-gallon "Thermos" flask, taken to the nearest airport, and sent to Adelaide by air, where they were stored at −25° C. until used.

Mosquitoes were collected in a swamp near Beswick Creek and around the settlement. These were stored in the

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refrigerator and sent to Adelaide, where they were identified by Mr. S. Gross, of the South Australian Museum; they were then stored until used for attempts at virus isolation.

Serological Tests.

Neutralization and complement fixation tests were carried out by means of the technique of Miles and Howes (1952), and complement fixation inhibition tests by means of the technique of Miles (1954).

Specimens of serum used in the complement fixation test were first screened at serum dilutions 1:5 and 1:10; all those giving positive or doubtful results were then tested at dilutions 1:5 to 1:80.

All specimens were tested by the neutralization test. Some of the bird sera were not available in sufficient volume for other tests to be performed, and some of the human sera proved anticomplementary.

Attempted Virus Isolation.

Pools of 40 to 60 mosquitoes were ground in sand in a mortar and resuspended in minimal quantities of rabbit serum saline. They were stored for one hour at +4° C., and centrifuged for ten minutes at 2000 revolutions per minute; 100 units per millilitre of penicillin and of streptomycin were added to the supernatant, and this was inoculated as follows: 0·03 millilitre intracerebrally to groups of six three-weeks-old mice; 0·1 millilitre to the chorio-allantoic membrane of groups of six six-days-old embryonated hen's eggs.

All material was given three blind passages at appropriate intervals before being discarded as non-infective.

Results.

Human Serum.

The results with human serum are shown in Table I. They are remarkably similar to those found in 1952. The over-all percentage of positive results for aboriginal serum is 86, the individual stations varying between 80% and 90%. However, there is a small difference in the ratio of positive results obtained by the complement fixation test to the whole. At Beswick Creek this has risen from 1:1·7 to 1:2·4, and at Murray Downs and Elkedra from 1:2·3 to 1:2·9. In one neutralization test a dose of 500LD_{50} of virus was used, instead of 50. The majority of the sera tested were capable of neutralizing the larger dose.

Thirteen of the sixteen subjects whose serum gave negative results were aged under twenty years; but this still leaves 74% of this group giving positive results, and the difference is hardly significant.

The one white adult tested gave a positive result, while five white children under the age of ten years all gave negative results, although only one of twelve aborigines of comparable age on the same station gave a negative result.

Goat Serum.

Nineteen specimens of serum from goats at Beswick Creek Settlement were tested for antibody; 16 had neutralizing antibody. After being heated at 56° C. for thirty minutes all these specimens of serum were anticomplementary. They were retested after thirty minutes at 60° C. After this treatment 18 were no longer anticomplementary. None gave complement fixation.

Domestic Bird Serum.

In the case of diseases which will affect domestic birds, these birds may be of great use in timing the most recent presence of the disease, since their ages are often known.

The results of testing birds from Beswick Station, Murray Downs and Elkedra are shown in Table II.

The birds at Beswick Station had been brought from Darwin after the last wet season and had been on the station about seven months. Two of them had both neutralizing and complement-fixation inhibiting antibodies. While it is certain that these birds must have had infection with a virus related to Murray Valley encephalitis during their life-time, it is possible that this was acquired before they reached Beswick, since over 50% of specimens of serum from aborigines near Darwin contained antibodies to Murray Valley encephalitis in 1952. All that can be stated is that either during the 1953-1954 wet season in Darwin or in the 1954 dry season at Beswick Station two of these 20 birds had been infected.

The Muscovy ducks, whether they had or had not been through a wet season at Elkedra, had no demonstrable antibodies.

The most satisfactory results were those obtained at Murray Downs. One rooster, four or more years of age, had both neutralizing and complement-fixation inhibiting antibodies. Three of nine fowls, fifteen months old, had neutralizing antibody, and two of these also gave a positive response to the complement-fixation inhibition test. None of 40 three-months-old cockerels gave positive results.

All these birds had been sent from Alice Springs as "day olds", and our previous investigation would suggest that viruses related to Murray Valley encephalitis visit Alice Springs only very rarely. We can therefore state that a virus related to Murray Valley encephalitis has been present at Murray Downs during or since the last wet season. There is no evidence that it had been present during the three months immediately before our visit.

Wild Bird Serum.

Previous work has shown that wild birds, more especially wading birds and water fowl, are commonly infected by Murray Valley encephalitis (Anderson *et alii*, 1952; Miles and Howes, 1953). We therefore collected both land and water birds in the swampy areas around Beswick Creek, and around the water holes of Murray Downs and Elkedra Stations. The detailed results are shown in Tables III and IV.

Despite the considerable areas of swamp around Beswick Creek, the number of waterfowl was very small, and we collected only seven specimens from the Pelicaniformes and Ardeiformes. Two of these seven gave positive results.

Many of the land birds collected yielded only minute quantities of serum, and pools had to be used. These varied from two to four birds. Among the sera tested, 20 were single specimens and seven of these gave positive results, two doubtful results, and 11 negative results. Ten were pooled as pairs, seven giving positive and three negative results. These results suggest that between 30% and 40% of the land birds in this area had neutralizing antibody to Murray Valley encephalitis virus.

Particularly notable among these results are those for the doves (*Geopelia placida* and *G. humeralis*). All seven specimens tested gave positive results. There were three individual sera, one pool of two, and three pools of four. In no species from which more than two sera were tested did all give negative results.

At Murray Downs and Elkedra the numbers of water birds collected were far more; but the land birds were limited to the two most common suitable species which frequented the water-holes—crested pigeons (*Ocyphaps lophotes*) and galahs (*Kakatoë roseicapilla*). All the specimens of serum collected were large enough to be tested individually, although there was not always enough serum for all tests to be performed. Twenty-eight birds belonging to the Ralliformes, Pelecaniformes, Ardeiformes or Anatiformes were tested, and 17 of these had neutralizing antibody. Of the 35 land birds tested, 12 gave positive results. The proportion of positive results among the water birds was almost twice that among the land birds.

The proportions of land birds giving positive results appear to be much the same in the Beswick and the Murray Downs areas. Among nine specimens of serum from Beswick which could be tested by all techniques and gave positive results to neutralization tests, three gave positive findings, either by complement fixation or complement-fixation inhibition. Among 20 from Murray Downs

TABLE I.

Results of Serological Tests on Human Sera.

Station.	Neutralization Test Result.		Complement Fixation Titre.						Anti-Complementary Sera.	Total.	Ratio, "Neutralization-Negative to "Complement-Fixation Positive".
	Positive.	Negative.	Less than 1:5	1:5	1:10	1:20	1:40	1:80			
Beswick Creek ..	39	7	21	5	3	3	1	0	13	46	2·4:1
Murray Downs ..	34	4	27	1	4	4	0	1	1[2]	38	3·3:1
Elkedra	25	5	20	4	2	4	0	0	0	30	2·5:1
Total ..	98	16	68	10	9	11	1	1	14	114	2·7:1

[1] Twenty-nine "neutralization-positive" sera were successfully tested by the complement fixation test at this station.

[2] This serum gave a positive reaction to the neutralization test.

TABLE II.

Results of Serological Tests on Domestic Birds.[1]

Station.	Bird.	Age.	Neutralization Test Result.		Complement Fixation Inhibition Titre.							Total.
			Positive.	Negative.	Less than 1:5	1:5	1:10	1:20	1:40	1:80	More than 1:80	
Beswick ..	Hen	18 months.	2	18	18	0	0	0	1	0	1	20
Murray Downs	Rooster ..	Over 4 years.	1	0	0	0	0	0	0	0	1	1
	Hens	15 months.	3	6	7	0	0	1	1	0	0	9
	Cockerels ..	3 months.	0	40	40	0	0	0	0	0	0	40
	Muscovy ducks	12 months.	0	6	6	0	0	0	0	0	0	6
		6 months.	0	7	7	0	0	0	0	0	0	7
Total ..	.. ..	.. .. ..	6	77	78	0	0	1	2	0	2	83

[1] All birds giving positive results to the complement fixation inhibition test gave positive results also by neutralization.

TABLE III.

Beswick Area: Results of Serological Tests on Wild Bird Sera.

Species.	Number of Specimens.	Neutralization Test Result.			Number Tested by Complement Fixation.	Complement Fixation Test Result.	Complement Fixation Inhibition.
		Positive.	Doubtful.	Negative.			
Peaceful dove (*Geopelia placida*)	3[1 2 3]	3	0	0	1	1:10	1:10
Bar-shouldered dove (*Geopelia humeralis*)	4[1 3]	4	0	0	1	0	0
Little pied cormorant (*Phalacrocorax melanoleucus*) ..	2	1	0	1	1	0	0
Australian darter (*Anhinga novæ-hollandiæ*	1	0	0	1	1	0	0
Straw-necked ibis (*Threskiornis spinicollis*)	1	1	0	0	—	—	—
Royal spoonbill (*Platalea regia*)	1	0	0	1	—	—	—
White-faced heron (*Notophoyx novæ-hollandiæ*) ..	1	0	0	1	—	—	—
White-necked heron (*Notophoyx pacifica*)	1	0	0	1	1	0	1:20
Australian little eagle (*Hieraaëtus morphnoides*) ..	1	1	0	0	1	1:10	0
Red-collared lorikeet (*Trichoglossus rubritorquis*) ..	4[1 1 1 1]	3	0	1	—	—	—
Banksian cockatoo (*Calyptorhynchus banksi*) ..	4	1	1	2	2	0	0
White cockatoo (*Kakatoë galerita*)	1	0	1	0	1	0	0
Red-winged parrot (*Aprosmictus erythropterus*) ..	4[2 2 9]	3	0	1	1	0	0
Dollar bird (*Eurystomus orientalis*)	4[1 1]	1	0	3	—	—	—
Pallid cuckoo (*Cuculus pallidus*)	1	0	0	1	—	—	—
Koel (*Eudynamys orientalis*)	1[1]	0	0	1	—	—	—
Magpie lark (*Grallina cyanoleuca*)	6[1 2 3]	3	0	3	1	0	0
Black-faced cuckoo-shrike (*Coracina novæ-hollandiæ*) ..	2	0	0	2	—	—	—
White-breasted cockoo-shrike (*Coracina hypoleuca*) ..	1	0	0	1	—	—	—
Silver-crowned friar-bird (*Philemon argenticeps*) ..	1[2]	1	0	0	1	0	±1:5
Australian crow (*Corvus cecilæ*)	2	1	0	1	—	—	—
Total	46	23	2	21	12[4]	2[5]	2[5]

[1] Pool of two sera.

[2] Pool of three sera.

[3] Pool of four sera.

[4] Of these sera, one gave negative and two doubtful results by the neutralization test.

[5] One serum gave a positive result by both tests.

and Elkedra giving positive results to neutralization tests, nine gave positive results to complement fixation or inhibition tests. No sera giving negative results to neutralization tests gave positive results to the other tests.

Attempted Virus Isolation.

Mosquito breeding was said to continue all the year round in the swamps in the area of Beswick Creek, and culicines were present both in the settlement area and in

TABLE IV.

Murray Downs and Elkedra: Results of Tests on Wild Bird Sera.

Species.	Number of Specimens.	Neutralization Test Result.			Number Tested by Complement Fixation.	Complement Fixation Test Result.	Complement Fixation Inhibition.
		Positive.	Doubtful.	Negative.			
Crested pigeon (*Ocyphaps lophotes*)	27	10	0	17	18[1]	2 (1 : 10)	0
Black-tailed native hen (*Tribonyx ventralis*)	6	3	0	3	5[2]	1 : 10	0
Coot (*Fulica atra*)	1	1	0	0	1	0	1 : 10
Little grebe (*Podiceps ruficollis*)	1	0	0	1	1	0	0
Black cormorant (*Phalacrocorax carbo*)	1	1	0	0	1	0	0
Little black cormorant (*Phalacrocorax ater*)	2	0	0	2	2	0	0
Australian darter (*Anhinga novæ-hollandiæ*)	3	3	0	0	3	0	2 (1 : 10)
Australian pelican (*Pelecanus conspicillatus*)	2	2	0	0	2	±1 : 5	2 (1 : 5)
White-faced heron (*Notophoyx novæ-hollandiæ*) ..	4	2	0	2	3	0	0
Black duck (*Anas superciliosa*)	1	0	0	1	—	—	—
Grey teal (*Anas gibberifrons*)	7	5	0	2	2	1 : 5	0
Galah (*Kakatoë roseicapilla*)	8	2	0	6	6[3]	0	0
Total	63	29	0	34	44[4]	4	5

[1] Seven of these gave positive results to the neutralization test.

[2] Two of these gave positive results to the neutralization test.

[3] None of these gave positive results to the neutralization test.

[4] Twenty of these gave positive results to the neutralization test.

the swamp. We were not able to get large numbers of mosquitoes back to Adelaide in good condition, and have tested only approximately 500 specimens. The mosquitoes collected were identified by Mr. S. Gross, of the South Australian Museum. Those in the settlement area were *C. fatigans*, and those in the neighbouring swamp *C. fraudator*. Through the kindness of Professor J. S. Robertson we were able to use laboratory space in the pathology department of the University of Adelaide, so that we avoided all possible contamination with Murray Valley encephalitis virus already present in our laboratory. The mosquitoes were tested in pools of 40 to 60 specimens. No virus was isolated.

During our visits mosquitoes were scarce at both Murray Downs and Elkedra.

Discussion.

The evidence we have given suggests very strongly that a virus closely related to that of Murray Valley encephalitis has been present in the areas we investigated not much more than twelve months before our visit, and probably during the last wet season.

The evidence of the fifteen-months-old fowls at Murray Downs would seem conclusive, while that of the fowls at Beswick suggests at least that such a virus had either been present at Darwin under eighteen months before our visit or had been at Beswick Station during the seven months before we took blood from the birds (November, 1954).

The ratio between neutralization and complement fixation positive results among the human sera also suggests recent infection. In our investigations on human sera in the South Australian part of the Murray Valley we found that the ratio of positive results of neutralization tests to those of complement fixation tests was 2:1 six months after the 1951 epidemic, but 8:1 thirty months after (Miles and Howes, 1953; Miles, 1955). The results obtained by Anderson *et alii* (1952) shortly after the epidemic suggested a rapid loss of complement-fixing antibodies.

The comparable ratios for serum from the areas we have investigated in the Northern Territory do not show such great changes. The change at Beswick Creek between 1952 and 1954 is from 1·7:1 to 2·4:1, while that for Murray Downs and Elkedra has changed from 2·3:1 to 2·9:1. These results go to confirm our findings in fowls, that a virus closely related to that of Murray Valley encephalitis must have been present in some areas of the Northern Territory more recently than 1951, and has probably been there during the wet season, 1953-1954, if not more recently. It is, of course, possible that repeated infections would induce lasting complement-fixing antibodies, and that the human results merely mean repeated infections in the past; but the explanation we offer is more in line with our findings on domestic birds.

In the main, the years since the summer of 1950-1951 have been abnormally dry in the areas we investigated, and many springs have dried back to unusually low levels, and it is possible that the small alteration in the neutralization : complement fixation ratio is due rather to a reduced number of infections than to a complete absence of infection in the area.

The results with wild birds mainly confirm earlier findings. Every species of bird of which a reasonable sample was tested was found to be carrying antibodies to Murray Valley encephalitis, but water birds were more commonly immune than land birds, at least in the Murray Downs area. The very high immunity rate among doves in the Beswick area is perhaps worthy of note. The known juvenile birds which we tested belonged to slowly maturing species and gave no evidence of the occurrence of infection more recently than one year before our visit.

The question whether the virus is that of Murray Valley encephalitis or a related virus is more difficult to decide, especially when we have failed to obtain a strain of virus. Recently the workers at the Queensland Institute of Medical Research (1954) have shown a close relation between the complement-fixing antigens of dengue and Murray Valley encephalitis, and have suggested that there may be some relation in the neutralizing antibodies also. On the other hand, Smithburn failed to find any such relation by neutralization tests on experimental animals or in the serum of human subjects of Murray Valley encephalitis, although some patients with Japanese B and St. Louis infection had dengue antibody. However, the occurrence was so irregular that it was suspected that the patients with both antibodies must have been infected with both viruses (1954).

Dengue is regarded as a human disease, transmitted from man to man by *Aëdes ægypti*. It has never been shown to infect wild or domestic birds, and attempts to pass it to fowls and pigeons have failed (Blanc *et alii*, 1928; Simmons *et alii*, 1930).

The disease in man is very different from the arthropod-borne encephalitides, and its behaviour in experimental animals is different, in that it proved very difficult to establish in the laboratory (Sabin, 1945). Nevertheless, these differences, and the reported failure to infect fowls, do not necessarily mean that there is not a reservoir of the disease among wild birds.

Dr. A. H. Humphry and Dr. C. E. Cook have kindly given us a great deal of information on the occurrence of dengue in the Northern Territory. Prior to World War II

dengue was endemic and occasionally epidemic in Darwin. New arrivals commonly suffered from typical dengue shortly after arrival, but Territorians did not suffer when they returned from trips away. It was concluded that residents of Darwin were frequently reinfected and eventually developed a solid immunity, although apparently they carried virus which could serve as a source of infection for non-immunes newly arrived. Dengue also occurred from time to time away from Darwin, and spread further south than latitude 20°.

After the reticulation of Darwin from Manton Dam in the early 1940's all domestic water storage tanks were destroyed by the army and active antimosquito measures were taken. In a recent entomological survey of Darwin it was reported that *Aëdes ægypti* was not found.

No cases of dengue have been reported in the Northern Territory since before 1949, and no people at present living at Beswick Creek, Murray Downs or Elkedra have seen or suffered from a disease likely to have been dengue since they have been in the area. The elimination of the focus of Aëdes breeding and of endemic dengue at Darwin must have reduced the probability of the maintenance of a focus of dengue infection in the Territory.

The lack of a history of recent cases of dengue in the Territory, the high infection rate among wild and domestic birds, some of which must have been infected during the twelve to eighteen months before our visit, and the ratio of neutralizing to complement-fixing antibodies led us to the conclusion that it is much more likely that the virus responsible was that of Murray Valley encephalitis than that of dengue.

If, as now seems likely, Murray Valley encephalitis is endemic in the Territory and could be responsible for some of the sporadic cases of severe encephalitis which are seen there, it is interesting to speculate on how a virus which is spread by mosquitoes normally infects wild birds and arouses a solid immunity after a brief period of viræmia can survive there.

As we have mentioned earlier, there are limited areas of permanent swamp and numerous permanent water-holes in the Territory, and in some of these areas mosquito breeding continues all the year round.

During the dry season more and more water-holes and swampy areas will dry out, and as they dry increasing numbers of birds will be forced to visit the permanent swamps. As a result it would be quite possible for a continual supply of susceptible birds to be brought to a small endemic focus throughout the year, and it would be possible for the virus to survive in a simple bird-mosquito cycle. It is probably unnecessary to postulate a reservoir in mites, as Miles and Howes (1953) previously suggested.

Summary.

1. An expedition in 1954 has confirmed the earlier finding of a very high rate of antibody to Murray Valley encephalitis in man in certain areas in the Northern Territory of Australia.

2. Antibodies were also common in wild and domestic birds.

3. The occurrence of antibodies in fowls of known age shows that a virus related to that of Murray Valley encephalitis has been present at Murray Downs Station during the fifteen months before December, 1954.

4. The results are discussed and it is concluded that the virus concerned is much more likely to have been that of Murray Valley encephalitis than that of dengue.

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TOXIC CONFUSIONAL STATES.[1]

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Toxic confusional states have four characteristics which make them worthy of earnest consideration: they are common, they may be serious, they are often preventible, and in the majority of cases they will respond most satisfactorily and often dramatically to appropriate treatment. Their diagnosis, regrettably, is still far too frequently missed, by psychiatric specialists as well as by workers in other medical disciplines; the resultant application of ineffectual therapy in consequence may lead to chronic ill health, permanent cerebral damage or even death.

To define what is meant by the term "toxic confusional state" is not as simple as it may first appear; it is often found that psychiatric syndromes entirely lacking in any true confusional element are included under this classification. It is proposed in this paper to refer only to those conditions in which true mental confusion, as shown by memory failures, disorientation and progressive impairment of intellectual functioning, can be objectively demonstrated; furthermore, such breaks with reality must be shown to be due to toxic effect on the neuron, whether the toxin is of exogenous or endogenous origin. It is not considered justifiable to include under this heading such conditions as depression, lethargy and irritability occurring in the myxœdematous subject, although this is not infrequently done. Neither can such conditions as chronic hallucinosis without mental confusion occurring after prolonged administration of amphetamine derivatives be properly classified here; similarly the continued exhibition of cortisone, if it should result in psychosis, produces a

[1] Read at a meeting of the New South Wales Branch of the British Medical Association on December 8, 1955.

clinical picture in which only very rarely is true confusion a significant feature (Rome and Braceland, 1952).

It is more generally agreed that states of confusion dependent upon progressive cerebral and neurologic disease are not to be considered in this context, nor shall be considered states of psychogenic confusion, whether neurotic or psychotic in nature. However, it will be seen that some of these latter may be separated only with considerable difficulty from the usual picture of the toxic-confusional psychosis.

Neuropathological Considerations.

The disorder of function underlying the syndromes of mental confusion is still, despite the dogmatism of many writers, largely speculative. Routine morbid anatomical studies are in most instances of little value; in patients who have succumbed after long periods of delirium only minor and inconclusive cytoplasmic changes may be found. However, it is reasonable to suppose that one or more of the following factors will be operative in the individual case.

1. Enzyme inhibition. Gould (1954) believes that through the mechanism of enzyme inhibition barbiturate drugs may exert toxic effects, in that brain respiration is interfered with either by interference with phosphorylation bonds in the enzyme systems or by adsorption of the barbiturate onto the protein complex.

2. Depletion of intracellular glucose associated with enzyme inhibition. Anæsthetic and narcotic drugs can reasonably be considered on the evidence as falling into this ætiological category.

3. Accumulation of metabolites, such as occurs in azotæmia, cholæmia, systemic infections.

4. Neuronal damage due to hypoxia, as in severe anæmia, congestive cardiac failure, severe surgical shock.

5. Shifts of body water and electrolytes, often associated with disturbance of carbohydrate respiration. Adrenal steroids, either in excess or in deficiency, may be presumed to cause alteration in psychological function at least in part through this mechanism.

6. Specific histotoxic action on the neuron, as may be presumed to be occurring in cases due to belladonna alkaloids, amphetamine derivatives *et cetera*.

Of all these factors, disturbances of enzymatic action have given rise to most interest in recent years. Armstrong and Gould (1955), who have given considerable thought to the pathological physiology of *delirium tremens* as well as to other confusional states, are of the opinion that confusion in the alcoholic will be apparent when the pattern of reversible oxidation-reduction reactions seen in intracellular brain carbohydrate metabolism is sufficiently disturbed. They posulate two mechanisms by which such disruption may be brought about: first, through increasing insufficiency of vitamins, and secondly, through the development of deviant intracellular metabolism as alcohol is forced as an alternative oxidizable substratum.

Clinical Picture.

The clinical picture of the fully developed toxic confusional state is generally typical, and only certain features will be commented upon here. It is commonly and correctly stated, though still overlooked at times, that the symptoms of these conditions will be exacerberated nocturnally, and the recognition of this temporal pattern of disturbance is often of assistance in establishing a diagnosis.

CASE I.—A woman, aged forty-eight years, examined in a gynæcological hospital after operation for carcinoma of the *cervix uteri*, reported strange visual hallucinations at night and had periods of great restlessness. By day it was most remarkable that she could discuss the phenomena of the previous night calmly and with substantial insight, and confusion was entirely absent at this time. Although only small therapeutic doses of bromides were being given, her serum bromide level was found to be 248 milligrammes per 100 millilitres, as her urinary output was far from adequate, owing (as was subsequently proved) to the involvement of both ureters in neoplastic growth.

The occurrence of gross disorientation and memory failures can hardly be overlooked; but it cannot be too strongly stressed that these conditions often can and should be recognized at a much earlier stage, when wise management may well avert a florid psychosis. Minor degrees of temporal disorientation in a previously alert patient can never be ignored or ascribed simply to lack of interest or of concentration; not infrequently the time sense is disordered well ahead of the development of confusion of place and person (Levin, 1945). Even earlier than this minor degrees of disturbance of judgement or failure of comprehension and reasoning may act as notable warning signs; the smallest deviation from what could be considered typical behaviour should not be ignored, especially under circumstances in which a known deliriant drug is being administered or in the presence of bodily illness capable of causing psychological disturbance.

Patients in an advanced stage will often show hallucinations, which may affect all senses. It is hard to crystallize what gives to the experienced observer the impression of the "toxic" nature of such hallucinations, but such an impression appears to be compounded from their characteristic nocturnal occurrence or exacerbation, their fear-producing quality and their fragmentary and fleeting nature. In some circumstances, despite the severity of their total disturbance, the patients are acutely aware of the abnormality of their hallucinatory experience, and such knowledge often increases their terror. Delusional beliefs will often be expressed, but despite opinions to the contrary — for example, Strecker, Ebaugh and Ewalt (1951) — I believe that it is rare for these delusions to be built up into a well-organized systematized pattern such as may occur in the functional psychoses. It is said that the perceptive disturbances in the confusional states are more correctly illusory rather than hallucinatory, but the distinction is artificial. However, illusions are extremely common, as is well known, and in large part are responsible for the aggression and over-activity which these patients may show.

The level of consciousness may fluctuate widely and rapidly in the delirious states, and the illness in which there are sudden transitions between a state of comparative lucidity and one of advanced confusion or even stupor should always be suspected of having a toxic basis.

Some Clinical Syndromes.

It is not proposed here to give an exhaustive list of the literally hundreds of known causes of toxic confusional states, which can be found in any standard text-book. Rather is it intended to mention clinical observations which may assist in the recognition of some of the more important syndromes. It is not generally held that specific symptom-groupings can be separated from the general picture of the confusional psychoses, although Curran (1944) holds the contrary view in claiming that certain toxins produce a diagnostic picture.

Bromide Psychosis.

A recent paper by Evans (1955) gives a disturbing picture of the frequency and importance of bromide medication as a cause of mental disturbance. His emphasis on the frequent absence of the so-called typical acneiform rash in cases of bromide psychosis is of considerable diagnostic importance. Curran mentions the not uncommon occurrence of hallucinosis in bromism without confusion or memory defect, and in my experience this undoubtedly occurs, and is, by previous definition, slightly outside the scope of this paper. On occasions these cases may even be diagnosed provisionally by telephone.

CASE II.—I was called on the telephone from a country hamlet seventy miles from Sydney by the husband of a woman whom I had treated on a previous occasion. He told me that she seemed to be "generally slowed up", sluggish in her behaviour and speech, and acting at times as if "drunk". At times her conversation was rambling, and she complained of peculiar sensations as if insects were crawling on her skin, and at times could be observed flicking at these imaginary creatures with her fingers. He stressed that it was only the sedative medicine which she was

obtaining from her local doctor that was "keeping her going at all". Her admission to hospital was arranged as a matter of urgency, and the pathology staff were requested to carry out a serum bromide estimation immediately on her arrival; the result proved to be 342 milligrammes per 100 millilitres.

Amphetamine Psychosis.

Amphetamine psychosis is stated to be confined exclusively to individuals of strongly psychopathic make-up (O'Flanagan and Taylor, 1950), but this is certainly incorrect. The occurrence of hallucinosis without confusion appears to be its more common form (Wallis *et alii*, 1949), but a true confusional psychosis is not rare. I have the impression that hallucinations, when they occur, are related even more closely than usual to the personality problems peculiar to the individual.

CASE III.—A woman, aged thirty-six years, recently divorced, developed neurotic symptoms after having been previously free from significant behaviour abnormality. She found that dextroamphetamine sulphate gave such relief that she rapidly increased the dose to the vicinity of 50 milligrammes daily. After her divorce, masturbation had become an intermittent habit, concerning which she felt much guilt; when her confusional state ultimately developed, voices repeatedly upbraided her for her wickedness in this connexion. She fully recognized the hallucinatory character of these experiences.

Barbiturate Psychosis.

Confusional states are comparatively rare in barbiturate addiction or overdosage, the more common manifestation being a predominantly neurological one in which nystagmus, extensor plantar reflexes, tremor and cerebellar disturbances of motility are not infrequently observed. However, emotional instability and failures in concentration may herald a florid psychosis with disorientation and unorganized delusions (Isbell *et alii*, 1950). The occurrence of delirium and convulsive seizures on withdrawal is well recognized but is easy to overlook.

CASE IV.—A middle-aged man in poor general health was admitted to hospital for the treatment of a neurotic type of depression. Shortly after his admission he became acutely confused and had several *grand mal* seizures, which rapidly progressed to *status epilepticus*. It was subsequently found that he had been taking phenobarbitone, one grain three times a day, for some years subsequent to his admission to hospital, when his medication had been abruptly and unwittingly suspended.

Psychosis with Liver Failure.

Mental confusion with lethargy may be the first readily observable sign of hepatic failure in cases of advanced liver disease. Gross electroencephalographic abnormalities may assist in the diagnosis. Foster (1949) holds that partial hepatic insufficiency may play a significant role in the production or maintenance of toxic delirium associated with malnutrition and avitaminosis, and states that response to vitamin therapy may not occur until normal liver function has been restored. In some of his cases the establishment of normal hepatic function was alone sufficient to reverse psychological abnormality.

Psychosis with Uræmia.

Renal failure may produce almost any type of psychiatric disorder including a confusional psychosis; the severity of the mental disturbance often appears to have a fairly direct relationship with the rapidity of onset of the renal disturbance, though there are numerous exceptions to this. Urine testing may be inadvertently overlooked if the patient is extremely violent and incontinent, and the diagnosis will thereby be missed (Baker and Knutson, 1946).

Psychosis from Digitalis.

Psychosis from digitalis is uncommon and is often difficult to diagnose with certainty, owing to the frequent concurrence of cerebral arteriosclerosis or other disturbance of the cerebral circulation. However, King (1950) found six cases in his own practice, and I am sure I have seen two cases in my own experience. The condition may occur well within the therapeutic dosage range, and should be suspected in any case in which mental confusion appears, although the cardiac function is simultaneously improving.

Post-Operative and Post-Partum Psychosis.

Cohen (1953) quotes Fishberg as stating that post-operative psychosis occurs once in every 400 operations. He points out that numerous factors may combine to produce the clinical picture: blood loss, operative or post-operative hypotension, infection, pain, tissue trauma, exhaustion, nutritional imbalance, anæsthesia, post-operative sedation, fear and unfamiliar surroundings, and the total impersonality of many surgeons. A true confusional psychosis in the puerperium must be very rare; most cases in which this appears soon manifest themselves as examples of puerperal schizophrenia.

Psychosis with Other Somatic Disease.

The occurrence of toxic delirium as an accompaniment to the specific fevers, pulmonary infections and allied conditions is too well known to warrant elaboration in this place. However, on occasions infections not usually considered likely to produce delirium may produce a severe confusional psychosis, and the confusion may in fact be the presenting syndrome. Such a case was recently reported by Antel *et alii* (1955), in which a confused, disorientated and hallucinated middle-aged male was found to be suffering from subacute bacterial endocarditis. The comparative rarity of such an occurrence suggests that each individual has a psychotic threshold, which presumably shows a normal distribution amongst the adult population, and that only the most susceptible of the total group are likely to develop delirium under such circumstances.

CASE V.—A female patient, aged thirty-seven years, was admitted to a general hospital suffering from ulcerative colitis of two years' duration, and on her admission was manifesting obvious signs of organic confusion. Her basic personality was of primitive type and her intellectual level dull. Signs of toxæmia in her general condition were never gross, though her temperature rose at times to 101° or 102° F. All investigations of her body chemistry gave results within normal limits, as did her cerebro-spinal fluid examination and investigation of her renal function. However, the clinical picture certainly indicated a toxic rather than a functional psychosis, and this was confirmed by electro-encephalographic examination. It was concluded after considerable observation that her psychological abnormalities were a direct result of her bowel disease acting on a susceptible neuronal pattern.

Differential Diagnosis.

The importance of correct and speedy diagnosis of the toxic confusional psychosis can hardly be over-stressed. In practice the differentiation of this syndrome from the picture of hysterical dissociation rarely proves difficult, and similarly the proper diagnosis from states of disorientation and amnesia due to neurological disease can usually be solved by an adequate history, physical examination and appropriate investigations. The problem resolves itself then mainly into the points of distinction between toxic confusion and the syndrome of the acute schizophrenic reaction, and not infrequently this distinction may be made only with considerable difficulty. Particularly is this so when the deliriant agent acts on a personality already showing schizoid features, which it proceeds to aggravate according to the usual characteristics of organic syndromes in general. Disorientation may be profound in schizophrenia, and inability to establish proper contact may render examination of memory impossible; vivid hallucinations and aggressive or even assaultive behaviour may be a feature of both conditions. The points which may be considered as favouring a diagnosis of organic delirium may be summarized as follows:

1. The "toxic" character of the hallucinations referred to previously.

2. Fluctuations in the level of consciousness. If the patient is seen in stupor there is usually little difficulty in deciding whether this is a catatonic manifestation or due to organic factors.

3. Nature of the delirium. In general it can be said that disorientation is more severe in a toxic reaction, but this may help little in the individual problem. However, Cohen, in the paper previously cited, makes the apt observation that "the delirious person mistakes the unfamiliar for the familiar . . . the schizophrenic in delirium mistakes the familiar for the unfamiliar".

4. Type of onset. This may be of assistance, with in addition careful study of the events immediately prior to the development of symptoms. *Delirium developing during* or just subsequent to transfer to hospital is most usually toxic in origin, and the absence of any apparent psychogenic stressful situation may be of some importance.

5. Thorough detailed physical examination. This may reveal unsuspected organic disease, which may suggest appropriate clinical investigations; the general state of health of the toxi-infective patient is likely to be inferior to the physical condition of the schizophrenic. Whatever the objective picture, my routine in any case in which the slightest doubt exists is to have the following procedures carried out in the first twenty-four hours: estimation of the blood glucose, the blood non-protein nitrogen, and the electrolyte contents, the serum bromide content and the serum calcium content, a chest X-ray examination, and cerebro-spinal fluid studies. Though these are often unrewarding, diagnostic information not rarely may be elicited, as the following case illustrates.

CASE VI.—A previously healthy adult male patient developed what at first appeared to be a fairly minor respiratory tract infection, but in the space of forty-eight hours became confused and drowsy. Physical signs were considered to be absent in the chest when he was examined in consultation by a thoracic physician, but X-ray examination revealed extensive consolidation of the upper lobe of his right lung. His delirium rapidly subsided when the pneumonic process was treated with appropriate antibiotics.

6. Electroencephalography. This should never be omitted when any doubt exists as to the correct diagnosis. Although the incidence of easily recognized abnormality in the standard tracing is twice as high in schizophrenics as in the normal population (Williams, 1954), it is rare to find an established toxi-infective delirium without conspicuous electroencephalographic abnormality. Romano and Engel (1944) demonstrated abnormal patterns in every one of 53 patients who showed disturbance of awareness, the abnormality being reversible to the extent that the delirium was reversible. The electroencephalogram may return to normal while some psychological disturbance remains, but it is uncommon for the reverse to be true, although after protracted hypoglycæmic coma I have on two occasions seen definite abnormalities persisting in the tracing for several months after restoration of what appeared clinically and psychometrically to be normal mental function.

Treatment.

Only some controversial aspects of management as seen by the psychiatric consultant will be touched upon here; the routine detail of nursing care, sedation and the maintenance of adequate nutritional status will be omitted.

1. Chlorpromazine given orally and parenterally would appear to have a definite place in inducing tranquillity in the acutely restless and disturbed delirious patient, special attention having been given to its role in *delirium tremens*. In the patient who is acutely physically ill it is probably best avoided, as the danger of circulatory collapse is real.

CASE VII.—On the first occasion on which I elected to use chlorpromazine in *delirium tremens*, I had been asked to examine a middle-aged female with a long history of alcoholism, who was restless, disorientated and noisy. Her general condition appeared satisfactory, although it was recognized that she had crepitations at both lung bases and her temperature was 101° F.; antibiotics were being administered. An intravenous injection of chlorpromazine (25 milligrammes) was followed by the development of a profound shock-like state from which she was resuscitated only with difficulty.

2. It has been customary for many years to treat *delirium tremens* with comparatively large doses of B group vitamins given parenterally, and this practice is often extended to other toxic states, although no satisfactory rationale had ever been advanced for such a procedure. Armstrong and Gould (1955) present their results in a series of 14 cases of toxic psychosis of varying ætiology, including alcohol, infection and sedative drugs. They use parenteral doses of the following order: aneurine hydrochloride, *1000 milligrammes; nicotinamide, 100 to* 400 milligrammes; pyridoxine, 200 milligrammes; together with ascorbic acid, 1500 milligrammes; this is repeated at four-hourly to eight-hourly intervals as required, and in some instances the result has been highly satisfactory. *Their rationale is that these high concentrations of* vitamins may "detach" the noxious agent from the enzyme to which it had become adsorbed, or alternatively that they may provide raw material for further enzyme synthesis. In only two cases in which I have had an *opportunity of following their recommendations* the results have been inconclusive.

3. The use of electrotherapy in the management of the toxic-confusional psychosis is fraught with grave hazard; though it is difficult in the present stage of our knowledge *to conceive any possible rationale for its use, the hard* fact remains that on many occasions it may produce dramatic improvement. It must be applied sparingly, for random use of convulsions at frequent intervals will inevitably intensify the confusion and indeed may lead *to permanent dementia.* On the other hand, if other less drastic measures have failed to control the confusion, electrotherapy must not be too long withheld, as the possibility of chronic psychosis supervening if delirium is permitted to continue too long is a very real one. In the case of ulcerative colitis recorded above (Case V) eight electroconvulsive treatments applied over a period of seven weeks resulted in complete remission of the psychiatric symptomatology. In this instance, as in all cases in which I have used electrotherapy with satisfactory result, the first convulsion was followed by a brief period of remarkable calm and lucidity before the delirium returned later in the day. If such a picture is not seen it would seem unwise to persevere with this form of treatment. It is again stressed that the number of convulsions given must be kept to the bare minimum.

Conclusion.

I end where I began, in emphasizing once more the importance and the frequency of the toxic-confusional psychoses. Although these psychoses are responsible for less than 10% of admissions to a psychiatric institution, they are conditions familiar to every general practitioner and are, indeed, the most common forms of frank psychosis with which he has to deal. It seems likely that as, in this neurotic age, the consumption of alcohol and sedatives steadily rises, the pattern of delirium will have a progressively decreasing chance of being ignored.

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TOXIC CONFUSIONAL STATES.[1]

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IN approaching the subject of toxic confusional states from the general practitioner angle I have in mind that in general practice one of the doctor's important functions is that of placing patients into broad categories. In chronic cases time is available for observation, investigation and consideration, especially the last mentioned when the diagnosis is a refined one.

Mental confusion by its very nature does not lend itself readily to deliberative measures. Even in the more chronic types the patients are not easily managed at home by even the most capable relatives. They are a bugbear in the home at the best of times. When, as is frequent, these cases present as an acute, often dramatic, phenomenon, something has to be done quickly to bring the patient under control, and the general practitioner has to be prepared to do it.

A specific identification of the cause of the confusional state can rarely be made from the characteristics of that state alone. It is then essential in the interests of good medicine for the practitioner to have in his mind a classification of the possible excitors of the condition as a prelude to emergency treatment and disposal.

At present we are considering only those cases in which, by exclusion, acumen, circumstantial evidence or other means the cause of the confusional state has been identified as toxic—that is, due to the action of a particular and theoretically identifiable substance. The main content of this paper is a review of such substances as their effects are likely to be met by the general practitioner.

The number of agents to be considered is large, and the first distinction to be drawn is in the conventional but convenient terms of exogenous and endogenous.

Exogenous Toxins.

The exogenous class comprises an imposing number and variety of groups of substances having associations with the processes not only of medicine and its therapies, but of diverse activities of our civilized life—industrial, social, recreational and domestic. Since we are taught first to do no harm, I will deal first with those agents in our proper therapeutic repertoire from the use of which an undesired and often unexpected mental confusion may arise.

The alkaloids will be considered first. The belladonna group provide us with two of the most notable drugs to be considered, atropine and hyoscine. While atropine is rated as a stimulant of the higher levels of the central nervous system and hyoscine as a depressant, the occurrence of idiosyncrasy may alter these tendencies unpredictably, so that even from therapeutic dosage the picture of overdosage may emerge. This usually includes a wild, excitable state with a degree of mental dissociation. More evidently neurological effects will also be apparent: tachycardia, hot, dry, flushed skin, and dry, sticky mucous membranes rendering the already incoherent utterances still less intelligible. A similar effect, but without the dry mucous membranes, may be produced by gross overdosage with pethidine.

By contrast the opiates (morphine, codeine, heroin) are more likely to produce a somnolent stupor as a background to the mental confusion. However, excitability may be seen as an idiosyncrasy or in habituation.

The factor of idiosyncrasy is well known in connexion with cocaine. While its cerebral effects may be either stimulant or depressant, confusion is occasionally seen in acute poisoning, though this is more characteristic of the addict.

Three common stimulants — caffeine, amphetamine and picrotoxin — are worthy of comparison. While the action of caffeine lies mainly at the psychic level, amphetamine at the psychomotor level, and picrotoxin mainly at the motor level, all three induce cerebral stimulation with the possible occurrence of irrationality and disorientation. In the case of picrotoxin the clonic muscular spasms are likely to detract from the significance of the cerebral effects.

Finally, quinine and the ergot alkaloids must be listed. On account of their common, ill-founded reputation as abortifacients, overdosage is more likely to be at the patient's instigation than at the physician's. Nevertheless the well-known idiosyncrasy to quinine as manifested by deafness and perhaps blindness may be responsible for mental disorientation from low dosage. In the case of ergot preparations, misuse in the treatment of migraine may cause mental confusion along with the more physical effects on the peripheral circulation.

To turn from the alkaloids to the sedative class, it is appropriate to enunciate a general proposition: if sedatives without analgesic effect are administered in the presence of pain, delirium is likely to occur. If the quantity of phenobarbital consumed is correlated with the diverse aches and pains which it is expected to relieve, this general principle is highlighted.

The barbiturates constitute by far the biggest of the sedative group on account of their numerous representatives, and their popularity with prescriber and patient alike. When one considers the amounts consumed, the total mental confusion resulting is not great. It may occur in four different situations: in true idiosyncrasy from reasonable doses, in heavy dosage in the presence of uncontrolled pain, as a transient phase of heavy intoxication before coma supervenes, and during the deprivation of the habitué. More commonly one sees the patient who is slightly overdosed. He presents a state which borders on the confused, best described as stupid. He (or, indeed, she) is unreliable in medical attendances, forgetful of instructions (including how to take the tablets or medicine), slow and depressed, and may have a characteristic fusty odour in the breath. At the same time disorientation and inaccessibility are probably absent.

The bromides merit special emphasis as insidious and potent *saboteurs* of higher cerebral functioning. Administered freely for a variety of complaints, especially neurotic instability, purchasable freely in a variety of preparations, bromide has the pharmacological properties of a cumulative poison. Owing to its interchangeability with chloride ions in the body fluids, perfusion occurs widely and excretion is indolent. Traces may be found in the urine several months after a single dose of two grammes (30 grains). In continued administration an acute psychosis may emerge suddenly. Mental disintegration may be so pronounced as to invite certification of the patient as insane. The characteristic acneiform rash may be absent. Evans (1955) investigated the serum bromide content in 100 consecutive patients admitted to Parramatta Mental

[1] Read at a meeting of the New South Wales Branch of the British Medical Association on December 8, 1955.

Hospital. In 19 the level was raised, and in seven of these it was raised sufficiently to implicate bromide as a contributory if not main factor in the mental incapacitation.

Chloral hydrate is less likely to cause mental aberrations in its direct effects than during the recovery period. However, in chronic overdosage and more especially in withdrawal, confusion and delirium may be pronounced and may resemble the common *delirium tremens*.

Diphenylhydantoin may have a small margin of safety.

A child was recently examined in a state of irritable restlessness, ataxic and uncontrollable. Interrogation revealed that a colleague, treating the child for hyperkinesia attributable to cerebral injury at birth, had recently increased the dose of "Dilantin" from 0·09 to 0·12 gramme daily. Restoration of the former dose brought the child back to his usual state.

The third major group of therapeutic agents is composed of the common analgesics and antipyretics. While mostly safe and effective, they are well known for their side effects, of which mental confusion is a rare one. Aminopyrine, phenacetin and acetylsalicylic acid have all been incriminated in this respect, though the infrequency of cerebral incapacitation contrasts strikingly with their universal popularity.

Insulin provides an apt example of the very thing we are considering. Overdosage, mistiming or misadventure may bring a diabetic's blood sugar content down to pre-coma level and his mental condition to an aphasic helplessness within a matter of minutes.

A seemingly healthy young man was observed waiting for meal service in a restaurant. Quite rapidly he became restless and fidgety, and in attempting to speak could utter only meaningless sounds. By the good sense of his observer he was prevented from going off in his motor-car and was taken to a nearby doctor. The diagnosis of hyperinsulinism was ultimately made and the usual recovery procured.

The proper training of a diabetic to recognize the early symptoms, and the universal carrying of a diabetic's identity card, will never completely eliminate this occasional challenge to a diagnostician's skill.

The antihistamines achieved a reputation for producing bizarre mental effects from the earliest days of "Benadryl". Although manufacturers have striven with partial success to provide the perfect antihistaminic, individual peculiar reactions, usually at the mental level, may still be seen even with proper dosage. As the side-effect is generally sedative, some clouding of intellectual functions is to be expected and may present a characteristic picture of intoxication.

The sulphonamides, while well known to produce nausea and depression of mood, occasionally generate a true toxic delirium.

A small boy, normally quite stable, had been put on a course of mixed sulphonamides for a mild respiratory infection a few days before he was brought in on account of intermittent terror states in which he saw spiders when left alone. He was afebrile, and it was thought unlikely that the infection was responsible for his confusional state. After discontinuance of the tablets it took several days for his delirium to pass completely.

Digitalis poisoning may cause mental confusion in its own right. This may lead to secondary confusion in the mind of the physician, who is all too familiar with the temperamental aberrations of patients in congestive cardiac failure. Complete discontinuance of digitalis therapy for two or three days may resolve the confusion in both parties.

Reference to cardiac failure invokes passing reference to mercurial diuretics, orally or parentally administered, and calomel, sometimes present in teething powders. In mercurialism, however, superficial effects are likely to be more prominent than mental effects.

A few of the newer preparations in therapeutic use require special, if brief, mention. Isoniazid has caused a toxic confusional state on therapeutic dosage. Cortisone and ACTH are well recognized as precipitants of a major psychosis, of which disorientation and intellectual impairment may be a feature. Fortunately patients under this treatment are closely watched by their physicians, who are well aware of the possibilities. Reserpin preparations, like most depressants, may undoubtedly induce a state of confusion up to a psychotic degree. To my knowledge true confusional states are not precipitated readily by "Largactil" alone, but on account of its power to potentiate other drugs, particularly sedatives and opiates, it must be mentioned.

A man, aged forty-nine years, was having intolerable pain from fungating malignant glands in the neck. He was given 50 milligrammes of "Largactil" three times a day, and first one-third, later two-thirds of a grain of "Omnopon" in the evening, by mouth. No advance in this régime has been necessary in a month; he sleeps most of the day and night, but can be roused to a degree of cooperation. However, he is likely to get up and wander about the house ill-clad and dissociated—a small disadvantage in exchange for continuous pain.

This completes my review of therapeutic agents which may be held responsible for confusional states. While it is by no means complete in detail — for example, anæsthetics have been omitted for obvious enough reasons — it is compiled essentially from the general practitioner's point of view and classified with an eye to the practical.

The next group of exogenous substances must be dealt with even more summarily. This section refers to frank poisoning by chemicals not normally administered medically.

Alcohol is undoubtedly responsible for more confusional states than any other substance. Despite its high place, a few brief generalizations must suffice. The occasional error of diagnosing other toxic states as alcoholic is a constant danger for the medical practitioner as well as for his patient. To separate the alcoholic component of a mixed intoxication presents a tricky problem. Apart from the social implications of alcohol, the practitioner's main concern is with the encephalopathies — acute in the form of *delirium tremens*, and chronic in the so-called Korsakow syndrome. The characteristic tremulous, irresponsible restlessness, even mania, of the former with its visual and sometimes auditory hallucinations, contrasted with the pathetic dementia of the latter, hardly requires description in this paper. However, of special interest to the general practitioner is the precipitation of *delirium tremens* by an intercurrent infection, particularly pneumonia. If one is aware of the past drinking habits in such a case, much can be done with sedation, with vitamin B_1, and even by way of prophylactic suggestion to the patient, to mitigate what can otherwise be a potential catastrophe.

A robust young man, not suspected of having been a steady drinker, was admitted to hospital with acute basal pneumonia. After a few days of normal progress he was suddenly missed from his bed. After a fruitless search of the hospital precincts the matron telephoned the ambulance for assistance in the search, but was told that the vehicle had just been called to an accident case at a nearby tram intersection. A nurse dispatched thither was able to identify as the missing patient the pyjama-clad figure rescued practically unhurt from a clumsy encounter with a tram. The smooth convalescence which ensued was enlivened by the patient's relish over his unremembered escapade.

The reference to encephalopathy leads naturally to the heavy metals. Generally, apart from a pre-comal phenomenon, confusional effects appear only in the chronic intoxications. Mercury, thallium and manganese intoxications tend to follow the more familiar pattern of plumbism, which may be regarded as a type for the group. Associated regularly with other signs of poisoning—anæmia, peripheral neuritis, mouth involvement *et cetera*—lead encephalopathy is unlikely to present as an isolated condition.

The largest group of poisons whose effects include a phase of mental confusion is composed of that vast number of inorganic or simpler organic chemical substances likely to be met in industrial processing, but well represented in most homes. As all of them can cause death, most of them can impel a victim across the no-man's land of mental dissociation before the entrenchments of terminal unconsciousness immobilize him. Among the simpler substances we have phosphorus, arsenic in its simpler soluble com-

pounds, carbon monoxide, carbon disulphide and carbon tetrachloride. Higher up the chemical scale we find methyl halides, metaldehyde, tetraethyl lead, amyl acetate, amyl nitrite, nitro-glycerol, kerosene, turpentine, phenols, glycols, benzol, DDT and petrol. Most of these and their numerous relatives produce mental confusion only in acute poisoning. This effect is more likely to be a dominant one when the poison has been inhaled as a vapour. The chief offenders in this respect are carbon monoxide and the volatile solvents; but the attractive white tablets of metaldehyde used as a fuel by mountaineers are worthy of note.

Turning from the toxicological to the biological, we come to the last group of exogenous poisons, those supplied by plants and animals. Obscure toxins with pronounced cerebral effects are found in the fungus *Aminita phalloides* and many of the venoms of spiders, scorpions, fishes and snakes.

Endogenous Toxins.

The second part of our original classification, confusional states due to the endogenous toxins, falls easily into two departments—the infective and the metabolic.

Quite the commonest confusional state which the general practitioner can place in this category is the simple febrile delirium. Particularly common in children, it may occur in any fever; it is usually worst at night, taking the form of panic states frequently with hallucinations, as in nightmares. The actual infecting organism is of little relevance with the following exceptions: typhus and typhoid, in which a temporary psychosis may occur; cerebro-spinal meningitis, in which the delirium is continuous, restless and vocalized; encephalitis; and cerebral malaria. Generally these febrile forms of delirium are incidental to the infection and are not in themselves a great problem. By contrast, the combination of an acute infection with a background of habituation to alcohol has already been emphasized.

In dealing with the metabolic endogenous intoxications it will suffice to mention confusion as a premonitory sign in the three classical comas — uræmia, hyperinsulinism (already described) and diabetes.

Uræmia, while mostly seen in the arteriosclerotic stage of life, may manifest itself even in younger people, with mental confusion as the presenting sign. When it occurs as a pre-comal phenomenon, the true cause is likely to become evident as consciousness dwindles, if the diagnosis is not made earlier by orthodox physical examination.

Incipient diabetic coma is marked by somnolence rather than by any spectacular mental behaviour like that of hyperinsulinism. Its faculty for appearing rarely in a subject who has not been under medical treatment before lends it a mark of treachery.

With a cursory reference to pellagra, in which mental effects may be most pronounced, but which is hardly to be classed as an intoxication, we come to the end of this review of toxic agents having a strong bearing on the subject of this paper.

Conclusion.

In conclusion, a few comments are offered from the practical angle. A confusional state does not appear with the label "toxic", and more difficulty is likely to be met in deciding whether it is of this or a different category than in identifying the intoxicant. Naturally most of these states are due to a combination of causes, particularly degenerative, asphyxial and psychiatric, as well as toxic. Many patients are by nature apt candidates for mental confusion under quite minor provocation. The simulation of bewilderment may be a tempting retreat from fearful responsibility.

The doctor who is faced with acute confusion in a patient he knows, and whose previous treatment he knows, is in an unassailable position by contrast with a doctor faced with a patient he has never seen before. In this connexion recent correspondence in the *British Medical Journal* has emphasized the value of having the nature of a drug inscribed on the container's label. The mystery once deemed to be necessary to good therapy has depreciated with the decline of empiricism. The addition of the letters "N.P.", standing for *nomen proprium*, to the directions on a prescription directs the chemist to label the container accordingly.

The greatest care may be needed to eliminate physical causes from what may seem a purely psychiatric condition, and similarly in the discovery of a confusional state in its incipient stage.

Regarding treatment in those cases in which appropriate specific treatment cannot be given, and in which suppression of the mental manifestation has to be attempted, paraldehyde has yet to be superseded. Barbiturates given intravenously may be useful for quick results and to provide a breathing space while longer-acting control is being instituted.

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PENICILLIN-RESISTANT STAPHYLOCOCCI IN THE GENERAL POPULATION.

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IT is now widely recognized that the majority of strains of *Staphylococcus aureus* isolated from lesions in hospital in-patients are resistant to penicillin, and that many are also resistant to other antibiotics (Rountree and Thomson, 1952; Barber and Burston, 1955). The extent to which the conversion to penicillin resistance of the staphylococci of non-hospitalized people has proceeded is of importance in any consideration of the value of penicillin therapy in staphylococcal infections occurring in general practice. It is for this reason, among others, that we have from time to time reported the results of surveys of nasal carriage of *Staph. aureus* in blood donors in Sydney (Rountree and Thomson, 1949; Rountree, 1951; Rountree, Freeman and Barbour, 1954). These surveys are based on the assumption (for which there is considerable evidence) that the nose is the chief reservoir of autogenous staphylococcal infection, and that the types of staphylococci found there are similar to those isolated from lesions.

Recently, Rountree and Freeman (1955) described the occurrence in Australia in 1953-1954 of a new phage type (80) of *Staph. aureus* belonging to Phage Group I. This organism had caused numerous outbreaks of neonatal sepsis, breast abscesses in mothers and boils in the nursing staff of hospitals; 94% of strains of this type isolated in widely distributed localities were penicillin-resistant.

Throughout 1955, we have continued to identify strains of this type from neonatal sepsis, from breast abscesses, from cross-infected wounds and from boils in hospital patients and staff. In addition, this penicillin-resistant organism has been isolated from people admitted to hospital with acute staphylococcal sepsis, and from furunculosis lesions in people having no connexion with hospitals. Furthermore, it has been suggested that Western Australia has experienced an "epidemic" of skin lesions due to penicillin-resistant staphylococci, and private information indicates that similar outbreaks of furunculosis may have occurred in various places in New South Wales.

It was considered worthwhile, therefore, to conduct a further survey of blood donors in Sydney in December, 1955, and at the same time to ask the donors if they had suffered from styes or boils during the preceding twelve months.

The information obtained is reported in the present paper, and is supplemented by the results of examining staphylococci isolated from lesions in casualty patients in this hospital, from lesions in private patients in Sydney, and from lesions in a consecutive series of patients in a general practice in Perth.

The methods used were similar to those described previously (Rountree and Thomson, 1949; Rountree, Freeman and Barbour, 1954).

Nasal Carrier Rates in Blood Donors.

Of the 200 blood donors from whom swabs were examined, 101 (50·5%) were nasal carriers of *Staph. aureus*, an incidence not significantly different from that found on previous occasions.

Penicillin-Resistant Strains.

The nasal carrier rates of penicillin-resistant strains found in three previous surveys and on the present occasion are summarized in Table I. In the present survey, 26 (25·7%) of the carriers were harbouring penicillin-resistant strains. In one carrier, the strain was resistant also to streptomycin. No strains resistant to tetracycline or chloramphenicol were found.

TABLE I.

Nasal Carrier Rates of Staphylococcus Aureus and of Penicillin-Resistant Staphylococcus Aureus in Blood Donors in Sydney.

Year.	Number of Subjects from Whom Swabs were Examined.	Number of Carriers.	Carriers of Penicillin-Resistant *Staphylococcus aureus*.
1949	200	90	8 (8·9%)
1951	200	95	7 (7·2%)
1954	200	98	13 (13·4%)
1955	200	101	26 (25·7%)

The important point emerging from these carrier rates is that the penicillin-resistant strains had doubled in number in twenty months.

Phage Typing Results.

In 1954, all the penicillin-resistant strains, save one untypable strain, belonged to Phage Group III. The typing results of the present series, given in Table II, show that approximately half the strains falling into Group III were penicillin-resistant. The majority (57·7%) of the resistant strains belonged to this group; but there were also five strains belonging to Group I (four of which were type 80), and one to Group II, as well as strains that could not be classified or were not typable. In other words, in the present series, penicillin resistance, hitherto confined chiefly to strains of Group III, appeared in strains belonging to other phage groups.

Incidence of Furunculosis in Blood Donors.

Of the 200 donors questioned, seven (10%) of the 71 women and 14 (11%) of the 128 men stated that they had suffered from boils or styes during the preceding year. No information of a comparable kind on the incidence of furunculosis in adults could be found in the literature; but it is our impression that this is a high incidence of infection, particularly in adults.

There was no evidence of any sex difference in the incidence of infection such as was described in relation to patients attending a skin clinic (Valentine and Hall-Smith, 1952), where male patients outnumbered female patients by 37 to 16.

Of the 21 people who had suffered from furunculosis, 11 were nasal carriers of *Staph. aureus* in December. Whether the strain present in their noses was the one that had caused their lesions obviously could not be determined with certainty. The typing results, which will be discussed later, suggested that it was likely that some, at least, of the strains had been the causal organisms in the lesions.

Types of Staphylococci Isolated from Casualty Patients.

All strains of *Staph. aureus* isolated from lesions in patients attending the casualty department of this hospital during the twelve months to the end of November, 1955, were examined for antibiotic sensitivity and phage type. The strains were isolated from septic lesions of the hands, arms, feet and legs, from ears, from infected lacerations, bites and wounds, and from boils, carbuncles and abscesses.

Of 245 strains, 105 (42·9%) were penicillin-resistant. These antibiotic sensitivities differ from those found in strains isolated from the hospital in-patients and staff. Over a similar period, 72·2% of 1398 strains were penicillin-resistant, 9% were resistant also to streptomycin, 27% were resistant to penicillin, streptomycin and the tetracyclines, and 6% were resistant to chloramphenicol as well as to the other four antibiotics. It was considered unlikely, therefore, that more than a very small proportion of the casualty patients had been infected while attending the hospital. (Strains from people attending the out-patient department were excluded from the survey because of doubts as to where they might have been infected.)

When the phage type distribution in these patients is compared with that found in the blood donors (Table II), several differences are observed.

The first difference concerns the fewer non-typable strains isolated from lesions (13·2%) compared with those from noses (20%). This has been found previously (Rountree, 1953), and its probable explanation is that some of the non-typable nasal strains are of low virulence or infectivity, and are therefore unlikely to cause lesions.

The chief difference appears, however, when the frequency distributions of the Group I and Group III strains are compared, and concerns particularly the penicillin-resistant strains; of these there is a larger proportion of Group I strains in the lesions than in the noses. This also was observed previously in strains from nurses'

TABLE II.

Phage Group Distribution of Staphylococcus Aureus Isolated from Nasal Carriers and from Lesions.

Phage Group.	Noses of Blood Donors.			Lesions in Casualty Patients.		
	Penicillin-Sensitive.	Penicillin-Resistant.	Total Number.	Penicillin-Sensitive.	Penicillin-Resistant.	Total Number.
I	16 (21·3%)	5 (19·2%)	21	37 (26·4%)	47 (44·8%)	84 (35·6%)
II	19 (25·3%)	1	20	41 (29·3%)	3 (2·8%)	44 (16·1%)
III	14 (18·7%)	15 (57·7%)	29	28 (20·0%)	42 (40·0%)	70 (30·0%)
IV	1 (1·4%)	—	1	—	—	—
Miscellaneous	—	—	—	5 (3·6%)	—	5 (1·8%)
Not classifiable	7 (9·3%)	3	10	4 (2·9%)	4 (3·8%)	8 (3·3%)
Not typable	18 (24·0%)	2	20	25 (17·8%)	9 (8·6%)	34 (13·2%)
Total	75 (74·3%)	26 (25·7%)	101	140 (57·1%)	105 (42·9%)	245

TABLE III.

Phage Group Distribution of Staphylococcus Aureus Isolated from Carbuncles, Boils and Styes, and from the Noses of Persons with Histories of Recent Furunculosis.

Phage Group.	Casualty Patients in Sydney.		Private Patients in Sydney.		Patients in Perth.		Nasal Carriers.		Total Number.	Penicillin-Resistant.
	Total Number.	Penicillin-Resistant.	Total Number.	Penicillin-Resistant.	Total Number.	Penicillin-Resistant.	Total Number.	Penicillin-Resistant.		
I	15	13	12	10	15	15	4	1	46 (47·9%)	39 (67·2%)
II	18	1	1	—	2	—	4	—	25 (26·0%)	1 (1·7%)
III	6	5	3	3	3	3	2	2	14 (14·6%)	13 (22·4%)
Miscellaneous ..	2	—	—	—	—	—	—	—	2 (2·1%)	—
Not classified ..	2	1	1	—	1	1	—	—	4 (4·2%)	2 (3·5%)
Not typable ..	1	1	2	—	1	1	1	1	5 (5·2%)	3 (5·2%)
Total ..	44	21	19	13	22	20	11	4	96	58 (60·4%)

noses and lesions (Rountree and Freeman, 1955) and is due to the occurrence of lesions caused by phage type 80. This strain is apparently of high infectivity, and lesions due to it often occur in the absence of nasal carriage.

Types of Staphylococci Isolated from Boils.

Since it is important to know what proportion of people suffering from furunculosis and consulting general practitioners may be infected with penicillin-resistant strains of *Staph. aureus*, the sensitivity to antibiotics and the phage type of strains isolated from boils and styes in certain groups of people were examined.

These groups comprised those with boils attending our casualty department, those from a number of private practices in Sydney in which there was no connexion with the hospital, and those from a private practice in Perth. The results, together with those of the strains obtained from the noses of the blood donors with a history of furunculosis, are collated in Table III.

Of the 96 strains, 58 (60·4%) were penicillin-resistant. When the nasal strains are excluded, 54 (63·5%) of the 85 strains known to have caused boils or styes were penicillin-resistant. Of the strains from casualty patients, 21 (47·7%) were resistant, while there was a greater proportion of resistant strains in the private patients. In the case of those in Sydney, this may have been due to some selection of the patients, whose strains were often examined because of failure of penicillin therapy. In Perth, however, consecutive patients consulting their doctor during the months of August and September, 1955, were examined. None had a long history of furunculosis, and none had been in hospital or had received penicillin during the month prior to investigation. In this group of patients, 20 out of 22 strains were penicillin-resistant, 14 of them being phage type 80.

When the phage groups of the strains from boils and styes were compared with those of the whole series of strains from all types of lesions in casualty patients and from the nasal carriers, a difference was immediately apparent. While approximately 30% of carriers and of casualty patients yielded Group III strains, only 14·1% of strains from boils belonged to this group. In a previous series of strains from boils (Rountree, 1953), and in a series from boils examined in London (Roodyn, 1954), a similar deficiency of Group III strains was observed. In these two previous series, approximately 50% of the strains belonged to Group II. In the present series Group II strains were also present, but the great increase in strains belonging to Group I, which was largely due to the high incidence of type 80 strains, depressed the proportion of Group II strains. (It is worth noting that only one Group II strain was penicillin-resistant.)

Although the strains isolated from nasal carriers in the donors with a history of furunculosis are small in number, the frequency distributions show the same deficiency in Group III strains, and it is therefore likely that strains isolated from these carriers were, in most cases, those that had caused their lesions.

Discussion.

The chief points of interest in the present survey are the increase in nasal carriers of penicillin-resistant staphylococci among blood donors in Sydney and the high incidence of resistant organisms isolated from patients suffering from furunculosis.

More than half the penicillin-resistant strains from boils belonged to Phage Group I, the majority being type 80, and it is probable that many of the so-called "epidemics" of boils have been due to the prevalence of this particular strain. However, there is evidence that the actual incidence of this organism may vary from place to place and from time to time. For example, the phage group frequency distributions of the strains isolated from a practice in Perth differed from those found in casualty patients in our hospital in Sydney, where there were a considerable number of infections caused by penicillin-sensitive Group II strains and relatively fewer type 80 infections.

Therefore, while these figures cannot be taken as an index of what may be occurring in every part of Australia, their implications are clear. In the treatment of furunculosis, penicillin can be expected to have little therapeutic efficiency. The actual proportion of such infections responding to penicillin will vary from place to place, but it is probable that at least 50% will be penicillin-resistant. This emphasizes the futility of persistence with penicillin therapy for patients who do not respond immediately, and the importance of carrying out sensitivity tests before the administration of any antibiotic. Sufficient has been written in the editorial columns of this journal to convince medical practitioners of the necessity of rational use of antibiotics, and the present findings merely underline what has been said already.

With regard to staphylococcal infections other than furunculosis, the figures from our casualty department and from the blood donors indicate that between 25% and 43% of these infections may be due to penicillin-resistant strains, and suggest that the therapeutic and prophylactic efficiency of this antibiotic in staphylococcal infections occurring outside hospitals is fast diminishing.

Summary.

In a survey of 200 blood donors carried out in Sydney in December, 1955, 26 (25·7%) of 101 nasal carriers of *Staph. aureus* were found to be carrying penicillin-resistant strains. This was double the number found in April, 1954. Of 85 strains isolated from furunculosis lesions, styes and carbuncles occurring in casualty and private patients, 63·5% were resistant to penicillin. The implications of these findings in regard to penicillin therapy are discussed.

Acknowledgements.

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private patients in Perth, and to Dr. A. Johnson, Acting Deputy Director, Commonwealth Health Department, Perth, for arranging their transport.

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Reports of Cases.

THE EMPLOYMENT OF ANÆSTHETIC PRINCIPLES IN THE MANAGEMENT OF A SEVERE CASE OF TETANUS.

By B. W. GUNNER, W. J. CUMMING AND I. SCHALIT,
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ALTHOUGH curare has been used to control the spasms of tetanus since the late nineteenth century, only in recent years has this form of therapy been widely utilized. The reluctance of physicians to use a muscle relaxant stems from the respiratory depression which follows. Any relaxant, when used in a dosage which adequately controls violent convulsions, will cause respiratory depression. Until recent years this depression necessitated the use of either an "iron-lung" or the cuirass type of respirator. Of late, intermittent positive pressure ventilation has been used to assist inadequate respiratory efforts, and it is a technique familiar to every anæsthetist. A method such as this was used extensively by Lassen (1953) and his colleagues during the 1952 Copenhagen poliomyelitis epidemic.

One of the first published reports on the use of curare in tetanus was by Cole (1934), who at that time had treated 19 patients with tetanus; two of these cases he described in detail. Cole appreciated that "curare or its alkaloids will be useful in the treatment of tetanus" and in the first of the two cases curare had an "action sufficient to tide the patient over the critical period of the illness by preventing exhaustion".

The accepted criteria of the severity of tetanus are:

1. The incubation period. The shorter is the incubation period, the higher is the mortality rate. With an incubation period of less than ten days according to Aird (1950) the mortality is 70%.

2. The trismus-convulsion period. Beare (1953) states that the time interval between the onset of trismus and the first convulsion is of the greatest value in prognosis. When this is less than forty-eight hours, recovery is improbable, and if it is less than twenty-four hours, death is almost invariable.

3. The site of infection. Again according to Beare (1953): "Following a miscarriage . . . tetanus arising from such a focus is almost invariably fatal."

When judged by these criteria the case to be presented was one of uncommon severity. The incubation period was short and was either of three or five days' duration. The trismus-convulsion period was twelve hours, and the site of infection was the uterus following abortion.

Clinical Record.

Period A: Admission to Hospital to Respiratory Control.

On April 21, 1955, a married woman, aged twenty-two years, was admitted to the Royal Newcastle Hospital with a history that on April 18 and 20 there had been an attempt to terminate her pregnancy by the use of a syringe. The first interference was followed by severe lower abdominal pain, and both this and the second attempt were followed by vaginal bleeding. Her last menstrual period had been in mid-January, 1955. She had had no previous pregnancies.

On examination of the patient, her temperature was 100·8° F., lower abdominal tenderness was present, the uterus was enlarged to the size of a twelve weeks' pregnancy, and from the os of the cervix a foul discharge issued. She was treated as suffering from an infected miscarriage and the uterus was not curetted.

On April 22 she complained of generalized abdominal pain; lower abdominal tenderness was present, but there was no rigidity. At 9.30 that night the same symptoms and signs were still present.

At 4 a.m. on April 23 the patient complained of stiffness of her jaw and soreness of the neck. By 7 a.m. she had developed marked neck stiffness, stiffness of her back, abdominal rigidity and *risus sardonicus*. The diagnosis of tetanus was made and a plan of treatment was prepared.

(For simplicity, April 23 will be referred to as the first day of the patient's illness, and time references will be to the day of the illness, rather than to the calendar date.)

A trial of the sedative control of tetanus was commenced. Anti-tetanus serum was administered, 20,000 units intravenously and 20,000 units intramuscularly. The patient was examined under general anæsthesia, and the cervix was dilated to allow free drainage from the uterus. Her uterus was not curetted as it was found to be perforated; 20,000 units of anti-tetanus serum were injected into each parametrium.

Post-operatively the patient was continually restless, and by 4 p.m., twelve hours after the onset of the trismus, convulsions had commenced. The convulsions at this stage consisted of opisthotonus and fixity of the facial muscles. These signs were precipitated by any painful stimulus.

Sedation was by the intramuscular injection of soluble phenobarbitone, *plus* thiopentone given intravenously. As the convulsions became more severe and more frequent, so the need for sedation progressively increased. Eventually by 2 a.m. the patient had received 27 grains of phenobarbitone and 1·8 grammes of thiopentone. Respiratory depression was present between the convulsions, which were now more frequent, more easily precipitated, and were accompanied by cyanosis. Heavy sedation was therefore abandoned, and the plan of curarization and respiratory control was initiated.

Per-nasal intubation was performed, and the trachea and bronchi were aspirated of mucus. Curare was administered as a continuous, dilute, intravenous infusion. Respiratory efficiency was controlled by a mechanical device exerting intermittent positive pressure on the concertina bag of an Oxford Vaporiser.

Period B: Respiratory Control.

From the second to the twenty-sixth day, inclusive, the patient's respirations were either controlled or assisted. This period was characterized by the control of convulsions, muscular flaccidity and adequate ventilation—provided that the airway was kept clear. Tracheotomy was performed on the second day. This allowed ease of bronchial suction and assured a good airway, without the constant laryngeal irritation of a Magill tube. D-tubocurarine chloride was given by the continuous intravenous

drip method in a concentration of 15, later 30, milligrammes per 100 millilitres. This was supplemented by d-tubocurarine, 10 milligrammes per cubic centimetre, if indicated. Dosage was adjusted so that muscle tone was just present and there was minimal resistance to the respirator. This degree of relaxation required an average dosage of eight to 10 milligrammes per hour. No further sedation was given until the evening of the third day. The patient then demonstrated that she was conscious by moving a finger or toe upon demand, and so sedation was recommenced.

Curare was given from the second until the twelfth day, a total of 2021 milligrammes of d-tubocurarine chloride being used. On the eleventh day curare was suspended to test for respiratory activity. Although spontaneous respirations remained almost non-existent, convulsions and respiratory muscle spasm progressively returned. The administration of curare was recommended and the dosage of sedation increased. On the twelfth day it was decided to discontinue the curare and further increase the sedation, if necessary. This decision was made because of the feebleness of spontaneous respiratory efforts.

As the disease progressed, a lessening in the violence of the tetanic spasms was reflected in the decrease in sedation necessary to maintain adequate control. With the passage of a Ryle's tube, pentobarbitone elixir replaced phenobarbitone given intramuscularly as the basal sedative.

Penicillin was administered to control the pelvic infection; in controlling respiratory infection it played a secondary role. "Tetracyn" and streptomycin were also administered until monilia appeared in the urine. The dose of anti-tetanus serum, 50,000 units, was repeated on the fifth day.

Areas of atelectasis recurred frequently, and the treatment of such areas was to suck out the offending plug of mucus via a Tiemann's catheter. Our personal experience with cases of bulbar poliomyelitis had shown that too frequent and too vigorous tracheal suction can abrade the mucosa and provide a site of origin of a descending purulent bronchopneumonia. Tracheal suction was therefore performed only when indicated, on an average three or four times daily. Because of the interference with respiration, postural drainage was of limited value during this period. Percussion of the chest to loosen tenacious secretions had, in cases of bulbar poliomyelitis, not yielded convincing results and was seldom employed.

Oxygen was not administered as a routine, but was available for use in an emergency. The necessity for its use indicated respiratory inefficiency, most commonly owing to partial blockage of the tracheotomy tube or to atelectasis. We were reluctant to use high concentrations of oxygen for any length of time, because its use masked any obstruction of the airway. There was also the possible danger of oxygen poisoning. Furthermore, from an isolated lung lobule, oxygen will diffuse in less than thirty minutes, whereas under the same conditions air takes sixteen hours to be absorbed. Thus high oxygen concentrations predispose to atelectasis.

In the absence of the normal physiological mechanism of moistening the inspired air, an attempt was made to humidify the air delivered to the tracheotomy tube. Despite many experiments, no method appeared to be wholly satisfactory.

During this period the patient was kept in fluid balance by intravenous therapy. Feeding via a Ryle's tube was contraindicated in the early stage because of the danger of passive regurgitation of fluid associated with a paralysed laryngeal reflex. Calories were therefore supplied by the intravenous route. The basal metabolic needs for a woman of her age, twenty-two years, height, five feet three inches, and weight, eight stone, are approximately 1350 Calories per day. When an average demand of 200 Calories extra was allowed for the pyrexia, 1500 to 1600 Calories were required per day. These Calories were supplied by the intravenous administration of ethanol and to a lesser extent by glucose. An in-dwelling urinary catheter assured that a full bladder would not mechanically impede respiration. It also permitted accurate fluid balance estimations.

Not until the fifteenth day was a Ryle's tube passed. By this stage the laryngeal reflex was active and there was less danger of passive regurgitation. The patient by this time had been in negative nitrogen balance for over two weeks; a high calorie, high protein, vitamin-supplemented, liquid diet was therefore used.

Apparatus.—Respirations were mechanically controlled by an Oxford vaporizer, the bellows of which were attached to an arm driven by an electric motor and suitable train of gears. Both the rate and amplitude of the bellows movement could be varied. The standard expiratory valve was used, so a positive intrathoracic pressure could conceivably persist during part, at least, of the passive expiratory phase. Unfortunately, neither the valve described by Mushin (1953) nor that of Crampton Smith *et alii* (1954) was available. In a patient with less cardiovascular reserve such considerations would be of greater moment. A spare hand-operated Oxford vaporizer was always ready for use in an emergency.

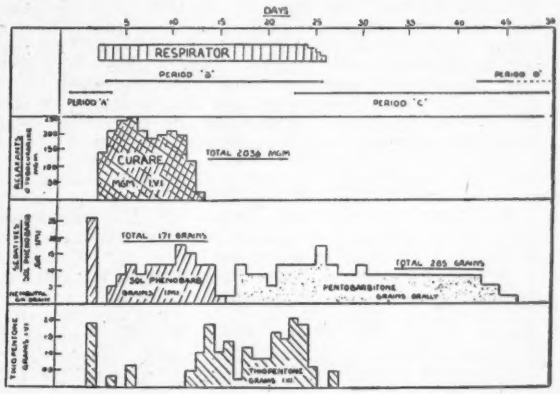

FIGURE I.

The control of respiratory rate and volume was both clinical and biochemical. Biochemically the period was occasionally one of respiratory acidosis, both compensated and uncompensated. This disturbance of acid-base balance may be largely due to the mechanics of the type of expiratory valve employed. The pyrexia of this period may be ascribed to both the pelvic inflammation and the pulmonary complications.

Period C: Respiratory Reeducation.

The third phase was characterized by returning muscle tone and voluntary limb movement, poor chest expansion and so more frequent episodes of atelectasis. Extending from the twenty-second to the fifty-first day, this period provided the most anxious moments of the illness. Other writers have stressed the difficulties of this period, and we had experienced similar reeducational problems in bulbar poliomyelitis. These few patients with poliomyelitis were also on the same machine-powered vaporizer.

The first respiratory activity was detected twenty-four hours after cessation of curare on the twelfth day. Breathing exercises were attempted from the thirteenth day, but not until the twenty-second day was the response sufficiently strong to warrant intensive training. The method used was to encourage and assist voluntary respiratory effort with the manual vaporizer until the patient showed signs of fatigue. Between exercises, sedation was heavy and the patient was encouraged to relax, in order to prevent waste of energy and respiratory inefficiency by breathing asynchronously against the machine. The exercise periods gradually lengthened and the response became more effective. Eventually the patient was able to breathe unaided, at first for only a few minutes, later for several hours. The machine was dispensed with on the twenty-sixth day.

The voluntary respirations at this time were rapid and shallow, and the problem of atelectasis assumed greater proportions. Secretions were removed by bronchial and tracheal suction and postural drainage. As the respiratory excursion increased, so the temperature settled—indicating that the pyrexia of this period was mainly pulmonary in origin. Biochemically this period was largely one of compensated respiratory acidosis.

As from the thirty-eighth day the tracheotomy tube was progressively blocked. It was kept *in situ* until tracheal suction was no longer necessary, as indicated by progressively more powerful cough, diminution of sputum and settling of temperature. On the fifty-first day the tracheotomy tube was removed; by this time the respiratory rate was almost normal. The heavy sedation of the early, difficult period of reeducation was gradually diminished and finally suspended some days prior to the removal of the tracheotomy tube. Once respiratory activity was firmly established, the patient was fed orally. Trismus limited the consistency of the food and at first only fluids were administered, later semi-solids.

Period D: Convalescence.

The fourth period, lasting from the fifty-second until the seventieth day, was one of recovery of muscle power and coordination and of regaining lost weight. The patient progressed by stages of being propped up in bed, sitting in a chair, walking and finally climbing steps. During this time the back stiffness gradually lessened and was almost absent at the time of her discharge from hospital, but trismus, although less, was still much in evidence. The tracheotomy fistula was closed and the voice was returning to its normal pitch.

When questioned about her memories of the earlier, critical stages of her illness, the patient showed that she had been conscious, but confused, much of the time. She had been aware of the machine and had appreciated her dependence upon it.

Each X-ray examination of the chest had revealed elevation of the right dome of the diaphragm. Before her discharge, there was seen on fluoroscopic screening to be paresis of this half of the diaphragm, the lung fields being clear. At the time of her discharge from hospital, the response to the Aschheim-Zondek test was negative and the pelvic viscera were normal to palpation.

Discussion.

In retrospect, the most difficult phase was that of respiratory reeducation; and because of the delay in return of respiratory muscular power the dose of relaxant might well have been less. In future cases, more muscle tone will be permitted, provided that it does not unduly interfere with the respirator, and the relaxant will be temporarily suspended every twenty-four or thirty-six hours to test for returning respiratory power. It may be advantageous to give more sedation in the early stages, so as to reduce further the necessary dose of relaxant; similarly a change from one relaxant to another might minimize cumulative effects.

Ethanol was shown to be a valuable source of Calories, but a disadvantage of its use is a tendency to cause chemical phlebitis. The enthusiastic cooperation of a clinical pathologist during the periods of respiratory control and reeducation is essential.

Anti-tetanus serum is usually stated to be ineffective once the disease is established. Similarly, it is difficult to evaluate the usefulness of the antibiotics. It is equally difficult to refrain from administering these drugs.

It has been stated that hysterectomy offers the only hope for survival in tetanus which is complicating a miscarriage (Beare, 1953). The present case does not support such a statement.

Summary.

1. A severe case of tetanus is described.

2. Attempts to control the convulsions by sedation failed. A total of 130,000 units of anti-tetanus serum was administered.

3. Curare, to the point of respiratory cessation, was given over a period of eleven days. A total of 2021 milligrammes of d-tubocurarine chloride was used. Control of respiration was by a mechanical device exerting intermittent positive pressure on an Oxford vaporizer over a period of twenty-five days. Respiratory reeducation occupied a further twenty-six days.

4. The treatment of pulmonary complications, fluid control and methods of feeding are mentioned.

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ADRENALINE ISCHÆMIA IN MIDDLE MENINGEAL ARTERY HÆMORRHAGE.

By D. H. McCLYMONT,

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IN C. E. Corlette's "A Surgeon's Guide to Local Anæsthesia" (1948) there is described a method of injecting an adrenaline solution at the *foramen spinosum* in cases of middle meningeal artery hæmorrhage. Dr. Corlette regretted that he had never had the opportunity to use this method in a case of middle meningeal artery hæmorrhage, but recently I was able to do so.

Clinical Record.

A male child, aged two years, fell 15 feet onto bitumen. He did not lose consciousness and appeared uninjured, although he was crying and frightened. He was brought to this hospital immediately. Examination of the central nervous system by the casualty medical officer revealed no abnormality, nor were there any apparent fractures. The child was sent home, and the father was advised to bring him back immediately if any untoward symptoms occurred.

Three hours after the injury, the parents noticed that the child's right arm and leg were twitching. He was brought back to the casualty department, and I was called to see him. He was unconscious, and convulsions were occurring on the right side of the body, with hypertonus of the right limbs. The left pupil was fully dilated and the right pupil was of normal size. Respiration was normal. I could find no obvious site of trauma to the skull. A diagnosis was made of left middle meningeal artery hæmorrhage with cerebral compression. The child was admitted to hospital for preparation for immediate craniotomy.

When I examined the child in the ward ten minutes later, he was deeply unconscious. He now had developed generalized convulsions and hypertonia. Both pupils were fully dilated and his condition was rapidly deteriorating. I then endeavoured to halt the rapidly progressive cerebral compression by causing an "adrenaline ischæmia" of the affected middle meningeal artery by injecting an adrenaline solution at the left *foramen spinosum*. This solution consisted of procaine, 2%, with adrenaline, one in 10,000 (0·5 cubic centimetre of adrenaline, one in 1000,

diluted to five cubic centimetres with procaine solution, 2%).

Whilst the solution was being prepared, it was reported that the patient was dead. On examination, the child was unconscious, flaccid and not breathing. However, after some seconds he started to breathe, and convulsions again occurred. The condition appeared typical of the Cheyne-Stokes phenomenon. I therefore proceeded with the injection. After the injection the head was shaved and the child was sent to the operating theatre. When I examined the child thirty minutes later just prior to operation, he was still unconscious and both pupils were still widely dilated, but respirations were normal and there were no convulsions.

At operation, under local anæsthesia a burr hole was made in the left temporal region; blood was evacuated. The patient's right pupil was then found to be smaller. An X-ray film taken at this juncture revealed a fracture from the fronto-parietal suture to the occiput, high up on the left side. However, the fracture could not be seen through the incision. Additional burr holes were made and more blood was evacuated. There was no fresh bleeding. By the time the scalp was sutured (with drainage) the patient was conscious. He made an uneventful recovery.

Discussion.

As no fracture was seen at operation, I conclude it was of the inner table of the skull. The arterial supply of the temporal area of the *dura mater* and corresponding inner table of the skull is the middle meningeal artery. As the *dura mater* is more adherent in the child than in the adult, I do not think venous bleeding would have caused this extradural hæmatoma. This arose from terminal branches of the middle meningeal artery.

Owing to the rapidity of progression of signs, I was sure that the child would soon die from cerebral compression. The injection is designed to cause ischæmia of the middle meningeal artery to prevent further gross hæmorrhage until decompression is carried out. The injection is made at the base of the skull, below the zygomatic arch, and is simple to perform. It may be life-saving, and I feel sure that it was life-saving in this case.

Summary.

1. A case of middle meningeal artery hæmorrhage is described.

2. An emergency injection of procaine and adrenaline was given at the *foramen spinosum*.

3. The ischæmia of the middle meningeal artery prolonged the patient's life until decompression could be carried out.

4. An extradural hæmatoma was evacuated through burr holes.

5. The injection of adrenaline at the *foramen spinosum* can be recommended as an emergency life-saving procedure in middle meningeal artery hæmorrhage.

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DISSEMINATED SCLEROSIS PRESENTING AS SCHIZOPHRENIA.

By NEVILLE PARKER,
Brisbane.

PSYCHOTIC symptoms are rarely associated with disseminated sclerosis; when gross mental abnormalities do occur they are usually overshadowed by the spectacular and varied abnormal neurological signs. Little attention has been given in the literature to the psychiatric features of this illness, and only a few cases have been reported in which they predominate. A patient who came under my care in 1953 had been examined by at least twelve doctors, and opinion was unanimous in diagnosing his condition as schizophrenia. Throughout the illness there were signs indicative of disseminated sclerosis, but these were overlooked until six months before his death. The diagnosis was confirmed at autopsy.

Clinical Record.

A. was born in 1925, the second son of a working-class couple. His mother played the dominant part in the family, always taking the initiative, and her somewhat overbearing manner made her a constant source of annoyance to hospital staff.

The patient had an uneventful early history; he was an average mixer at school and had an average scholastic record. As an infant he developed measles, whooping-cough and mumps; there were no other significant medical illnesses. After leaving school at the age of fourteen years, he had three jobs until his call-up at eighteen, when he joined the Seventh Division and served in New Guinea and Borneo. As a youth he had few friends and was inclined to be a poor mixer. He did not have a close relationship with his brother (his elder by four years), and never developed an interest in girls. He was not one to show emotion at any time; even as a child he would not cry when beaten.

When he returned from the war in 1946 his mother noticed a pronounced change; he seemed to be lacking in interest and energy and was content to sit for hours listening to the radio. Formerly he spent little time at home; after his return he simply sat at home every night. He had no strong inclination to any particular job, and mainly on his mother's decision became an apprentice wood machinist. He kept at this job for two years, but was disinterested and inefficient and seemed to lack a grasp of what he was doing. Early in 1950 he sustained a minor injury to his hand from the machine, and left work never to return.

In November, 1949, he first came under medical attention, complaining of frontal and occipital headaches and giddy spells; these were fully investigated. The social worker's report described his marked personality change; no one had any comprehension of what he was thinking, and none of his family could establish any real communication with him. He accepted all his mother's criticisms without comment or retaliation. Every person who examined him was struck by his apathy and indifference; three doctors noted a hesitancy of speech, and one observed a slight irregular nystagmus on fixation to the outer side. However, his withdrawn manner was so pronounced that these signs, so important in retrospect, were passed over.

Full examination of the central nervous system revealed no other abnormality, but the findings on lumbar puncture were of considerable interest. The report reads as follows: "Pressure within normal limits. Queckenstedt test normal. Leucocytes 2/cmm. Protein 50 mgm%. Wassermann negative. Colloidal gold 555543210." X-ray examination of the skull revealed no abnormalities.

In view of the history coupled with the striking shallowness of affect and dreamy other-worldliness the patient displayed, schizophrenia was diagnosed and an attempt was made at social rehabilitation. This was unsuccessful, and in November, 1951, he was given a three weeks' course of sub-coma insulin therapy without effect. In July, 1952, he was admitted to the Brisbane Mental Hospital, still dull and apathetic, and was conspicuous for his laziness and untidy habits. He did not know why he was admitted to a mental hospital, and did not care at all; when he was asked how he felt his reply was "Never felt better", or "I'm one hundred percent". His answers to questions were to the point, but there was no spontaneous conversation.

For a while he displayed evidence of confabulation, talking about his war experiences in the Middle East, although it was obvious that he had never been there.

Occupational therapy was of no help, so he was given eleven sessions of electro-convulsive therapy. This produced no change, and a course of insulin coma therapy was administered. Altogether he had 165 hours' hypoglycæmia and three and a half hours' coma; no complications developed during treatment. He was discharged from hospital in December, 1952, with his condition essentially unchanged.

He became difficult to manage at home, and was readmitted to the Brisbane Mental Hospital in November, 1953. He had become very childish and would sit about all day, smoking quietly with an intelligent look on his face; but when he was spoken to his expression would resolve into a silly grin. A Bellevue Wechsler intelligence test and Rorschach test at that time showed a widespread devastation of mental functioning with an intelligence quotient of 51. Severe deterioration was obvious; affect was inappropriate and general apathy prevailed.

On this second admission to hospital he presented with a completely different picture, neurological signs overshadowing any psychiatric symptoms. The striking feature was his impaired motor function. He was unable to perform simple tasks requiring coordination; there were clasp-knife rigidity of all limbs, knee and ankle clonus, and past pointing to the left; the plantar reflex was extensor on both sides. Frequency of micturition was also noted. Sensory function could not be tested, owing to lack of cooperation.

He still remained well orientated and could answer questions on current events when concentrating, but there was impairment of memory for recent happenings. At no time was there any suggestion of delusions or hallucinations. His physical condition gradually deteriorated, although he insisted he was "a ball of muscle", and soon he lay helpless with generalized spasticity, unable to do the simplest tasks. He died suddenly on May 2, 1954.

Pathologist's Report.

The brain was examined by Dr. M. J. J. O'Reilly, at the Laboratory of Micro-Biology and Pathology, Brisbane; the report is as follows:

Macroscopic.—The brain shows no significant abnormality of vessels, membranes or external surface. On section there is seen to be well-marked dilation of the posterior half of each lateral ventricle which is more prominent on the left side where it measures 4-5 cm. in diameter.

Microscopic.—All areas of the brain sectioned from the frontal cortex down to the upper spinal cord and including the cerebellum show numerous inflammatory foci scattered apparently at random in both white and grey matter. Although lesions are present in all areas examined, they are more widespread and of greater severity in sections taken from the occipital lobes on each side. The foci consist of accumulations of lymphocytes, mononuclear cells and glial cells and do not appear to occur in relation to vessels or to neuronal cells. Although neurons are involved in some foci and show varying grades of degeneration, this appears to be an incidental rather than a primary event.

Blood vessels in the neighbourhood of the inflammatory foci show prominent cuffs of inflammatory cells and in some places this cuffing is very marked. The vessel walls themselves, however, are not significantly affected nor can any definite thromboses be found. There is also an associated meningitis, the leptomeninges being infiltrated with inflammatory cells similar to those found in the foci and surrounding the blood vessels. In one or two places, notably the cerebellum, the meningeal exudate contains a number of polymorphs.

Myelin stains showed that scattered areas of demyelination were present though not prominent.

These findings support the clinical diagnosis of a relatively acute and rapidly progressive form of disseminated sclerosis.

Discussion.

Mental Symptoms.

In the era of descriptive psychiatry, a wide variety of mental symptoms were observed in association with disseminated sclerosis. This diversity is so great that a useful grouping of symptoms cannot be formulated. From the very nature of its pathology it is not surprising to find that, clinically, disseminated sclerosis may simulate any other nervous disease from both a mental and physical standpoint. The mental symptoms may, like the neurological signs, be inconstant, shifting and undergoing complete remissions at any time in their course.

The most frequent manifestation described is a certain amount of mental deterioration shown by impaired memory, slowness in the stream of thought and emotional indifference (Strauss, 1938). Dementia, when it occurs, cannot be differentiated from dementia due to other causes. Cottrell and Wilson (1926), in a study of 100 consecutive cases, found a pronounced change in mood in all patients, the greatest number having increased cheerfulness. They stated that changes in emotional expression, in emotional control and in sense of physical well-being were far more frequent than any single sign of a neurological nature, and that they constituted a diagnostic triad of greater value than any neurological symptom complex.

The sense of physical well-being, referred to as *eutonia sclerotica*, was most pronounced in our patient. This was in striking contrast to his physical state. It is less frequently found than *euphoria sclerotica*, which as Pratt (1951) has shown is not a characteristic feature of patients with disseminated sclerosis. All who exhibited euphoria as the predominant mood gave evidence of widespread cerebral disease.

So far no one has conclusively demonstrated the mechanism by which mental symptoms are produced in this illness, and the relationship of psychic disturbances to anatomical changes found in the brain is still controversial. Many believe that the psychotic symptoms are dependent on the personality and mental make-up of the patient before the disease developed. Such symptoms become apparent because of loss of inhibitory mechanisms due either to organic lesions or to psychogenic factors associated with the manner in which the patient reacts to his illness.

This patient, as a youth, had reacted to an overbearing, dominant mother by becoming a schizoid personality, and it is consistent with the dynamic theory that the psychosis he developed would be schizophrenic in nature.

Cerebro-Spinal Fluid Changes.

In the early stages of his illness this patient's cerebro-spinal fluid gave a paretic type of reaction to the Lange test and a negative response to the Wassermann test, and did not contain an increased amount of protein; these findings should have made the diagnosis of disseminated sclerosis suspect. Although there have been conflicting reports on the cerebro-spinal fluid changes in this disease, the consensus of opinion is that a paretic or luetic type of response to the Lange test, a negative response to the Wassermann test, a weak globulin response, little or no increase in protein content and slight pleocytosis together have diagnostic value (Kinnier Wilson, 1954).

Incidence.

Few patients are ever admitted to mental hospitals for psychotic complications of disseminated sclerosis. Only two such patients have been admitted to the Queensland mental hospitals in the last three years, out of a total of 3051 admissions, and this is consistent with figures reported elsewhere (Brown and Davis, 1922). As we do not know the proportion of persons with disseminated sclerosis among the general population, this does not help in estimating the incidence of psychosis among patients with disseminated sclerosis; but it is the experience of most neurologists that pronounced psychotic manifestations are rare. In THE MEDICAL JOURNAL OF AUSTRALIA only one case

of psychosis associated with disseminated sclerosis has been recorded (Schmalzbach, 1954).

Summary.

1. A case of disseminated sclerosis presenting as schizophrenia is described.

2. The mental symptoms found in association with this illness are briefly discussed.

3. Comment is made on the cerebro-spinal fluid changes and the incidence of psychosis in disseminated sclerosis.

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Reviews.

CORRIGENDUM.

IN a review of "Urology", a three-volume work edited by Meredith Campbell, published in the issue of January 28, 1956, two misprints appeared which should be corrected. In the reference to the chapter on suprapubic prostatectomy the word "adenectomy" appears; in the reference to the chapter on transurethral prostatic resection the word "adenomatomy" appears. In each instance the word should be "adenomectomy".

Anxiety and Stress: An Interdisciplinary Study of a Life Situation. By Harold Basowitz, Harold Persky, Sheldon J. Korchin and Roy R. Grinker; 1955. New York, Toronto and London: The Blakiston Division, McGraw-Hill Book Company, Incorporated. 9" x 6", pp. 336, with 44 illustrations. Price: $8.00.

IN "Anxiety and Stress", described as an interdisciplinary study of a life situation, Dr. Basowitz and his colleagues report their psychiatric, psychological and biochemical investigations on a group of paratroopers in training. In admitting the difficulties of distinguishing between fear and anxiety, the authors define the latter as "conscious and reportable experience of intense dread and foreboding, conceptualized as internally derived and unrelated to external threat". But it must have been impossible to exclude the influences of fear and external threat in this research. The experiments and matters investigated included clinical interviews and self-ratings with a view to comparison between air-borne anxiety and the "free" anxiety of pathological states, the effects of these emotions on visual perception, memory and intellectual control; the relationship between initial personality and reactions to the stresses of training; the hippuric acid secretion (usually raised in morbid anxiety states); the blood eosinophile level; the blood glutathione concentration. The blood eosinophile level proved to be the most sensitive of all the biochemical tests, since it fell sharply in a majority of the trainees in response to the various stresses of their training. The blood glutathione level also fell in a significant number, usually some ten hours after a focal stress, while the excretion of hippuric acid was very little affected. The authors suggest that the hippuric acid system is less responsive to anxiety associated with the feeling of shame at failure to jump than to fear of sustaining physical injury (if indeed these two psychological reactions can be differentiated). On the psychological side it appears that on the whole little anxiety was either felt or expressed, and was more of the shame than of the harm variety. Those who failed to make the grade showed more harm anxiety than those who completed their training. Curiously enough, there was a definite increase in emotional disturbance following graduation, the "end-phenomenon", which the authors ascribe to the temporary relaxation of discipline and absence of need to exercise self-control. This "research magnificent" has at least exposed the difficulties of demonstrating any clear relationship between biological processes and anxiety. The individual has his own special formula of reaction, usually too small to measure and often not reaching a peak within a practicable period. The authors emphasize the need to know much more about the early patterning of visceral responses to emotion.

The Medical Significance of Anxiety. By Richard L. Jenkins, M.D.; 1955. Washington: The Biological Sciences Foundation, Limited. 9" x 6", pp. 50. Price: $1.00.

IN "The Medical Significance of Anxiety" Dr. R. L. Jenkins stresses the need to recognize and deal with this emotion in all branches of medical practice. The medical practitioner must deal not only with the fears and anxiety of the patient who is physically sick, but also with these manifestations which result from the spilling over into the autonomic system of impulses which are denied more direct expression. Dr. Jenkins indicates how anxiety may become self-perpetuating and self-accentuating, so that in chronic anxiety states the mechanism is far removed from the circumstances which initiated it. He quotes Ewen Cameron's list of the somatic manifestations of anxiety, many of which need to be differentiated from symptoms and signs of organic disease. Both hysterical conversion syndromes and schizophrenia may be preceded by phases of morbid anxiety, which in hysteria conversion states may reappear when the hysterical disability has been removed. Dr. Jenkins gives useful practical advice in the differentiation between psychotic and psycho-neurotic depressions, and points out that fatalities from barbiturate intoxication often result from overdoses taken inadvertently while in a "toxic fog" rather than with suicidal intent. It is pointed out that chlorpromazine and rauwolfia may produce or intensify depression. Sound advice is given about the psychiatric approach and psychotherapy.

The author suggests that anxiety often results from multiple choice—"price of human flexibility and creativeness". This very practical little book is commended to senior medical students and to practitioners of all ages.

Financing Hospital Care in the United States: Volume II. Prepayment and the Community. Edited by Harry Becker; 1955. New York: McGraw-Hill Book Company, Incorporated. 9" x 6", pp. 380, with 86 illustrations. Price: $4.50.

Financing Hospital Care in the United States: Volume III. Financing Hospital Care for Nonwage and Low-Income Groups. Edited by Harry Becker; 1955. New York: McGraw Hill Book Company, Incorporated. 9" x 6", pp. 128, with 22 illustrations. Price: $2.50.

IN 1951 a Commission on Financing Hospital Care was established in the United States of America as an independent non-governmental agency to function for a two-year period. Its reports up to the end of 1953 are published in three volumes: I, "Factors Affecting the Costs of Hospital Care"; II, "Prepayment and the Community"; III, "Financing Hospital Care for Nonwage and Low-Income Groups".

The second and third volumes are now under review. Both volumes are incredibly comprehensive reviews of their subjects, there being 181 principles and recommendations, and "the soundness of their recommendations is evidenced by their wide-spread application today in hospital administration and community planning for hospital services".

In Volume II, voluntary prepayment is defined as "an orderly method of financing hospital care through voluntary periodic payments to purchase assurance that hospital care required by covered families or individuals will be financed from the pooled fund created by such payments". There are 15 principles underlying this report. Space does not permit quoting them in full. The resemblance to the principles of the National Health Service in Australia is clearly seen in number 2: "Payment of the cost of hospital care is primarily the responsibility of the individual or family unit. The community should assume responsibility for payment only when the individual or family unit is unable to pay for care . . . ." Number 15 is equally worth quoting for the lesson it has for Australia.

> The general public is seeking more comprehensive benefits. The accomplishment of this objective requires better understanding and cooperation by the public, hospitals, prepayment agencies and the medical profession and the development of methods to discourage unnecessary utilization of hospital beds and services . . . .

A most comprehensive review of the origin and development of prepayment is given. Population coverage is next

discussed. In 1953, 59% of the total United States civilian population had varying degrees of protection against the cost of hospital care. The progress of extending population coverage, the gaps in this and the problems of extending coverage to non-wage and low-income groups are discussed in detail. The effectiveness of benefit provisions, their extent and the gaps in this respect, alternative approaches, the cost of filling the gaps and the factors affecting the price the public pays for protection and the effective and economical use of prepayment funds are exhaustively studied.

Finally, a series of recommendations are made, and those relating to efficiency in provision of hospital services and the elimination of their unnecessary use have special interest for all associated with hospital administration and medical practice.

Volume III, "Financing Hospital Care for Nonwage and Low-Income Groups", states 17 principles which underlie the report. The subject is then discussed under the following headings: (1) Why are we concerned with the problem of financing hospital care for the non-wage and low-income groups? (2) Who can be expected to pay for hospital care? (3) Groups that cannot pay for hospital care. (4) Existing provisions. (5) Some proposals.

The volume concludes with a list of recommendations. For medical administrators, whether governmental or non-governmental, for those associated with medical and hospital benefits organizations, and for the medical profession at large these reports of exhaustive studies in the field of hospital care and financing provide a wonderful stimulus to thought and action along logical lines to resolve a problem which in very many respects is closely paralleled in this country.

Clinical Biochemistry. By Abraham Cantarow, M.D., and Max Trumper, Ph.D.; Fifth Edition; 1955. Philadelphia and London: W. B. Saunders Company. Melbourne: W. Ramsay (Surgical), Limited. 9¼" x 6", pp. 772, with many illustrations. Price: £4 10s.

WITH the increasing use of biochemical knowledge and techniques in clinical medicine there is need for a book which will give a detailed and accurate account of modern biochemistry in its relation to disease processes in man and their treatment. The modern text-books of biochemistry deal with the subject from the point of view of the chemistry of the processes taking place in all living things, and they touch only lightly on the applications of the knowledge to disease processes. A book which has gone through four editions in twenty-five years must have considerable appeal to medical men for whom it is intended. The fifth edition of "Clinical Biochemistry", by A. Cantarow and M. Trumper, has recently appeared. The text has been virtually rewritten and a great deal of new material added, so that it is practically a new book. The ground covered is extensive. Sufficient of the pure biochemistry of the various processes going on in the body is given to enable a clear understanding of the application of this knowledge to disease processes. The book is in no sense a text-book of pure biochemistry, but the information given is completely up to date, clear and adequate. It is a big and expensive book. The clinical part is very well done and the book should be invaluable to any medical man wishing to understand the nature of disease processes in so far as they are understood, the changes in the biochemical processes in disease, and the scientific reasons for different types of treatment aiming to restore the system to normal.

The sections on sodium, potassium and chloride metabolism, water balance and acid-base balance are particularly well done and together occupy 78 pages.

There is an adequate bibliography of selected papers for further reading, the papers being mostly reviews and monographic discussions. The book can be thoroughly recommended to all physicians, especially those who write papers for medical journals.

The Distribution of the Human Blood Groups. By A. E. Mourant, M.A., D.Phil., D.M. (Oxon.), with a foreword by H. J. Fleure, F.R.S.; 1954. Oxford: Blackwell Scientific Publications. 9" x 6", pp. 460, with four text figures and nine maps. Price: 42s.

THE main object of this book, as stated by the author, is to bring together as much as possible of the information given by the blood groups on the relationships between the different divisions of the human race. It thus possesses a far wider interest than might be inferred from its title; indeed the title is very much of an understatement. In a foreword, Professor H. J. Fleure states that "in 1951, the Nuffield Foundation made a five-year grant to the Royal Anthropological Institute to aid the study of blood groups as a clue to the understanding of human diversity. Dr. A. E. Mourant, as one of the leaders of blood-group research, was invited to be honorary consulting adviser of the scheme, which employs a staff to collect data and to work out the statistical results of full investigation". At that time the most recent work dealing with the whole of the existing data on the distribution of the blood groups was W. C. Boyd's "Blood Groups", published in 1939. This was followed in 1950 by "Genetics and the Races of Man", by the same author. There was still, however, a growing demand for a new and comprehensive work on the subject which would bring the anthropological part of Boyd's earlier work up to date. The present book was written to meet this demand. The general plan of the book is as follows: the first chapter is introductory; in the following five chapters an account is given of the distribution and anthropological application of each of the systems of blood groups—the ABO blood groups, the Rh blood groups, the MNSs blood groups, the Lewis blood groups and, finally, the P. Lutheran, Kell, Duffy, Kidd, and other systems. In Chapter VII other genetical characters of anthropological value are considered. Then follows a series of chapters dealing in detail by regions with the distribution of the blood groups. Finally, Chapters XIV to XX deal with various special topics: migrant and hybrid populations; the blood grouping of bone and tissue specimens; the blood groups of animals and their relation to those of man; some technical considerations and "An Attempt at a Synthesis". A series of maps is furnished showing the distribution of blood group genes in Europe and in the aboriginal populations of the world; and also a series of tables setting out the basic facts of blood group distribution in a form useful to the research worker. According to the author, the compilation of these tables was the "hardest, or at any rate least congenial part of the work". In the bibliography, which includes 1716 references and occupies 107 of the 428 pages of the book, Mourant states he has "tried to include references to all existing works on the distribution of the human blood groups other than those already quoted directly or indirectly by Boyd in 1939". There is a general index to the text, and there are topographical and zoological indices to the bibliography. This brief description shows how thorough and painstaking a piece of work this is; the book, however, must be read if its scholarly, scientific, and, one might add, artistic character is to be appreciated. To mention one small detail, the quotations which accompany the chapter headings are a delight. Here is one of the best of them, from the heading of Chapter VI, on "The P. Lutheran, Kell, Duffy, Kidd and Other Systems":

> Strange is it, that our bloods
> Of colour, weight, and heat, all pour'd together,
> Would quite confound distinction, yet stand off
> In differences so mighty.
>
> —Shakespeare, *All's Well That Ends Well*, II, ii.

Although its subject matter is intricate and highly technical, and it is destined to be a standard reference work, this book is never dull. Its compilation has evidently been a labour of love, and as such has a certain light-heartedness and clarity. *O si sic omnia!*

The Hypophyseal Growth Hormones, Nature and Actions: International Symposium. Edited by Richmond W. Smith, junior, M.D., Oliver H. Gaebler, M.D., and C. N. H. Long, M.D.; 1955. New York, Toronto and London: The Blakiston Division, McGraw-Hill Book Company, Incorporated. 9" x 6", pp. 592, with many illustrations. Price: $12.00.

THIRTY-THREE years ago J. A. Long and H. M. Evans detected growth-promoting activity in crude extracts of the anterior lobe of the hypophysis. Since then an enormous amount of experimental work has been done; the growth hormone has been isolated as an apparently pure crystalline protein, and the properties and effects in the animal body have been studied. The present position with regard to knowledge of the growth hormone was persented by 45 workers from North and South America and England at a symposium held at the Henry Ford Hospital in October, 1954. The papers presented and the discussions which followed the papers are given in the volume under review.

The symposium was divided into five parts: (*a*) bioassay, preparation and physicochemical properties of growth hormone, with five papers; (*b*) effects of growth hormone on certain structures, with five papers; (*c*) growth hormone and energy sources, with ten papers; (*d*) growth hormone and cellular systems, with five papers; and (*e*) influence of growth hormone on the mammary gland and on human metabolism, with two papers on the mammary gland and two on human metabolism. All the papers were followed

by general discussions, which are reproduced in full. Probably everything that is known about the growth hormone of the anterior lobe of the hypophysis and its actions is noted in this book. The papers are of the very highest quality, although there is a good deal of overlapping, and what is left out in the papers is brought out in the discussions.

A great deal is known about what administration of growth hormone to animals does in the way of causing retention of certain elements, such as nitrogen, phosphorus and calcium, but very little about the cellular mechanisms concerned. The effects in human patients are extremely variable, and no clinical use seems to have been found for the hormone. The present position has been well stated by C. N. H. Long in some closing remarks: "Any attempt to draw final conclusions concerning the chemistry or the physiological and metabolic effects of the growth hormone would not only be untimely but a task beyond the power of any one individual to accomplish."

For anyone wishing a detailed and authoritative account of the pituitary growth hormone—there are 576 pages in the book—this book is undoubtedly the best available source, but there is little that would be of much use to a medical practitioner in his practice.

Transplantation of Tissues, Cartilage, Bone, Fascia, Tendon, and Muscle. By Lyndon A. Peer, M.D.; Volume I: 1955. Baltimore: The Williams and Wilkins Company. Sydney: Angus and Robertson, Limited. 10" × 6¾", pp. 438, with 163 illustrations. Price: £7 8s. 6d.

LYNDON A. PEER has collected and summarized in this first volume of his work a great bulk of literature dealing with the transplantation of cartilage, bone, fascia, tendon and muscle. He himself has advocated the implantation of "diced cartilage", contained in tantalum mesh or small vitallium moulds. The resulting cartilage plaques are used to replace defects in the skull, ears, joints, chest wall and other parts.

The book is very instructive, and contains much factual material, ranging from cytology to surgery. It is a pity, therefore, that the author should have chosen for his frontispiece the imaginative evolutionary diagram of Stanley, and that he should have elaborated this in his text. He shows no understanding of the distinction between vital and non-vital activity, or of the infinite gulf between the automotive and the heteromotive; between the autoperfective action of the living and the transient action of the non-living; and between the movement-unto-tension of the living and the movement-unto-equilibrium of the non-living. But he is not daunted by the defects in his equipment, and he goes on boldly to derive living forms from crystalline minerals, bridging the infinite gap by nothing more than an arrow.

Recent Advances in Radiology. By Thomas Lodge, M.B., Ch.B. (Sheff.), F.F.R., D.M.R.; Third Edition; 1955. London: J. and A. Churchill, Limited. 8¾" × 5½", pp. 368, with 182 illustrations. Price: 45s.

"RECENT ADVANCES IN RADIOLOGY", by Thomas Lodge, has been published in a third edition; the two previous editions appeared in 1931 and 1938; they were edited by Peter Kerley. The book is very condensed and every page is of such importance that it is difficult to do it justice in a short review. On reading it one feels how impossible it is for the ordinary hospital radiologist to keep abreast of the advances being made in the special sections of neuro-radiology, cerebral angiography and cardioradiology. The author stresses the importance of the plain films in cranial conditions, taken in various projections; he also points out the difficulty in demonstrating fractures in basal regions of the skull. Some excellent films of various intracranial lesions are reproduced. Myelography, with "Lipiodol" and "Myodil", is being used more frequently and the optimum amount of the opaque medium has been increased to six millilitres. Stress fractures of the limbs are being reported in increasing numbers, and it is pointed out that repeated small injuries are the causal factors. The various complicated bone lesions occurring in childhood and adult life are set forth in clear fashion and well illustrated. Various authors have found difficulty in differentiating between hyperparathyroidism and renal osteodystrophy, but usually the former can be diagnosed from radiographs, although there may be some relationship between the two conditions. Fibrous dysplasia of bone is another difficult condition which is dealt with in clear fashion. Rheumatoid arthritis receives special mention. Various workers are of the opinion that the lipping of the vertebral bodies follows some protrusion of a disk with attempts to buttress the weakened area by bone formation. The œsophagus is discussed in detail and the various lesions are well illustrated.

A useful chapter on the colon with a discussion on the value of enemata is well worth study. The contrast enema and the tannic acid (2·5%) enema are being found of great value. A lateral view of the pelvi-rectal junction has proved useful in many cases. Cholecystography is still being widely used and the intravenous injection of "Biligrafin" is of great help in depicting the bile ducts. Advances in cardiology are set forth. Kymography is being used extensively. In bronchoscopy new water-soluble media are coming into favour; but the author still considers "Lipiodol" of the greatest use in this work. Cocaine derivatives are looked on as safer than those of the "Decicain" group for preliminary anæsthetization in this class of work. Aortography in renal conditions is becoming more popular; the technique of injection is described. This work is a very valuable one and is well worth careful study.

Symposium on Atherosclerosis. Held under the auspices of the Division of Medical Sciences, National Academy of Sciences, and National Research Council; at the request of the Human Factors Division, Air Force Directorate of Research and Development (March 22-23, 1954). Washington: National Academy of Sciences, National Research Council. 10" × 6¾", pp. 250, with many illustrations. Price: $2.00.

THIS is a symposium of 23 papers with discussions and group summaries. It grew out of the desire of the American Air Force to gather current knowledge on the atherosclerotic process and, pragmatically, its effect on air force economy. It was sponsored by the National Research Council. Although little appears to have emerged that will allow pilots to fly higher, faster or longer, this was inevitable, and it is to the credit of the originators that the problems have been attacked at a fundamental level.

Each author is a recognized authority in his own field, the papers are of necessity brief and discursive, but are all well documented, and the book is an excellent summary of present knowledge and guide to more detailed and critical reading.

It is arranged in five sections. The first deals with structure and function of vessels, including the blood supply to their walls, their role in the diffusion of lipid and protein, and some discussion of anatomical and biochemical abnormalities which may be related to heredity. The second discusses damage to the vessel wall by intramural hæmorrhage, physical, chemical and infective agents, endocrine abnormalities, hypertension and hypervolæmia with experimental studies of resulting intimal and medial reactions. There is a short section on the role of the electron microscope. Lipid and steroid metabolism is next discussed, with an assessment of the effect of diet in respect to populations, living conditions, war and famine, and finally a study of plasma lipids and lipid transport.

Medical and Public Health Laboratory Methods: Successor to Fifth Edition of Laboratory Methods of the United States Army. Edited by James Stevens Simmons, S.B., M.D., Ph.D., Dr.P.H., S.D. (Hon.), and Cleon J. Gentzkow, M.D., Ph.D.; 1955. Philadelphia: Lea and Febiger. Sydney: Angus and Robertson, Limited. 9¾" × 6", pp. 1192, with 115 illustrations and nine colour plates. Price: £10 3s. 6d.

THIRTY-EIGHT years ago the first edition of this book, then entitled "Laboratory Methods of the United States Army", was compiled at the instance of Surgeon-General Gorgas. It was intended as a small pocket manual for use in the United States Army establishments of World War I. In 1919 a more comprehensive edition was prepared; and, subsequently three new editions appeared. Each of these, having regard to the current developments in laboratory medicine, represented a material expansion of its immediate predecessor. The fifth edition, published in 1944, like the first, was prepared to meet a war-time need. Earlier editions were already well known to military and civilian laboratories in various parts of the world.

The popularity of the book, both in diagnostic and public health laboratories, was maintained during the post-war years. In consequence the editors decided to issue the present edition, which was revised and rewritten to include the more recent advances in laboratory practice. It has appeared under a new title: "Medical and Public Health Laboratory Methods: Successor to Laboratory Methods of the United States Army."

The revised edition contains fifty-two chapters embracing a wide range of laboratory subjects. The chapters are arranged in eleven parts, as follows: "Clinical Pathology", "Chemistry", "Mycology", "Bacteriology", "Rickettsias and Filterable Viruses", "Protozoology", "Helminthology", "Entomology", "Pathology", "Special Veterinary Methods"

and "Statistical Methods". Specialized information on these diverse topics has been written by thirty-five contributors, each an expert in his particular field. The book is attractively produced and illustrated. In the majority of chapters an ample text is supplemented by liberal references to recent literature.

The editors have succeeded in their stated objective to present a book with a wide range of usefulness which would include the requirements of hospital diagnostic laboratories and establishments dealing with military and public health problems. The worker concerned with general diagnostic procedures will discover much information of value in this authoritative work, and the specialist in some branches of laboratory practice will find it a worthy addition to his library.

Dextran: Its Properties and Use in Medicine. By John R. Squire, M.D., F.R.C.P., J. P. Bull, M.D., W. d'A. Maycock, M.D., and C. R. Ricketts, Ph.D., F.R.I.C.; 1955. Oxford: Blackwell Scientific Publications. 8½" x 5½", pp. 92, with many illustrations. Price: 15s.

DEXTRAN as a plasma substitute is now very widely used, and a general account of its properties and uses should be of value to medical practitioners. J. R. Squire, J. P. Bull, W. d'A. Maycock, and C. R. Ricketts have endeavoured to give this information in their small book of 91 pages. The book starts with a section of seven pages on the desirable positive and negative qualities of substances to be used as plasma substitutes. Dextran appears to approach the desirable qualities more nearly than any other substances which have been used. Then follow twelve pages on the chemistry of dextran. This part is too detailed for the average reader. Thirty-two pages are taken up with discussion on the behaviour of dextran in the body and the effect on body constituents. This contains a great deal of useful information. After a short section on specification of dextran, its clinical use is discussed. This takes only ten pages and leaves much to be desired. No doubt much of the information required for a rational use of dextran as a plasma substitute is contained in the section on behaviour of dextran in the body, but as the book is obviously intended for medical practitioners it would have been more useful to have a more detailed account of clinical use and effects in one place. There are also a short section on experimental uses of dextran and two appendices.

There is a great deal of information in the book, and it will be useful to anyone wishing to obtain this information; but it could have been presented better.

The Spine: A Radiological Text and Atlas. By Bernard S. Epstein, M.D.; 1955. Philadelphia: Lea and Febiger. Sydney: Angus and Robertson, Limited. 10" x 7", pp. 540, with 331 illustrations. Price: £9 1s. 6d.

THIS is a most comprehensive review of present-day knowledge of the normal and pathological conditions seen in the spine. The normal spine is considered by embryological and developmental viewpoints until adult age. The author discusses the methods of radiological approach. He thinks that the referring physician should state the particular area to be examined and send a short history with the patient. The writer shows a distinct leaning to the practice of myelography, but many of the illustrations are far from convincing. No more than six cubic centimetres of "Pantopaque" should be used, and every effort should be made to remove the medium after the examination is complete. A great amount of space is devoted to malformations, and many interesting cases are reported and well illustrated. Diseases of congenital, endocrine and metabolic origin, such as osteochondrodystrophy, dyschondroplasia, achondroplasia, *osteogenesis imperfecta*, are described in minute detail. In the section on inflammatory, degenerative and "noxious" diseases (the last-mentioned does not tend to form cysts and it is generally found in covering parasitic cases) it is pointed out that bone hydatid situations where the blood supply is good, as in the spongy portion of the vertebra, and it does not affect the cartilage. Spinal hydatid occurs in about 1% of hydatid infections.

The author classes the Marie-Strümpell condition as a rheumatoid arthritis and also refers to *spondylitis osteoarthritica* as a spondylosis; efforts have been made for some time to use this nomenclature. An interesting discussion on tuberculosis of the spine is well worth careful study, and it is stated that the condition is rarely recognized until it has been in existence for at least six months. The author refers to changes in caisson disease and the occurrence in it of areas of aseptic necrosis. Neoplastic conditions are common, but it is almost unknown for them to occur as direct extensions from a neighbouring lesion. Most spinal metastases occur by venous extension. Hodgkin's disease is difficult to differentiate from neoplasm. Numerous other conditions, such as chordoma, sarcoma, hæmangioma and osteoid osteoma, are described and illustrated. Spondylolisthesis receives special attention. The author has seen disk degeneration following lumbar puncture due to the escape of nuclear fluid after injury to the disk. The author also makes the statement that the small triangular areas frequently described as persistent epiphyses may be due to anterior disk protrusions, but this is not convincing. The author considers that any post-myelographic complications are not due to this procedure, but rather to injury produced at the time of puncture. Changes in inflammatory diseases of the cord and in the various anæmias are described. This is an excellent work and is well worth close study.

Notes on Books, Current Journals and New Appliances.

CORRIGENDUM.

IN the issue of February 11, 1956, a note on a pamphlet "Clinical Interpreter" was published. Unfortunately the usual description was omitted; that description is now given as follows:

"Clinical Interpreter: For Use with New Australian Patients", by David Pitt and John Kiernan; 1955. Ripponlea, Victoria: Published by M. J. Hardy. 8" x 5", pp. 38. Price: 7s. 6d.

Books Received.

[The mention of a book in this column does not imply that no review will appear in a subsequent issue.]

"Hypnosis and its Therapeutic Applications", edited by Roy M. Dorcus, Ph.D.; 1956. New York: McGraw-Hill Book Company, Inc. 9" x 6", pp. 337.

There are seven contributors to this volume and the subject is discussed in twelve chapters.

"The Treatment of Renal Failure: Therapeutic Principles in the Management of Acute and Chronic Uremia", by John P Merrill, M.D.; 1955. New York: Grune and Stratton. 8½" x 5½", pp. 252, with illustrations. Price: $6.75.

Intended to serve as a guide to the treatment of renal insufficiency and renal failure, for which there is "no rule of thumb".

"The Medical Clinics of North America"; 1955. Philadelphia and London: W. B. Saunders Company. Philadelphia Number. 9" x 6", pp. 309, with illustrations. Price: £7 5s. per year in cloth binding and £6 per year in paper binding.

There are 38 contributors to this number which consists of two symposia. The first symposium is on diabetes and obesity. It comes from the Benjamin Franklin Clinic of the Pennsylvania Hospital, is edited by G. G. Duncan and contains 13 articles. The second symposium is on gynæcology and obstetrics in general practice, is edited by L. C. Schaffey and W. R. Lang, and contains ten articles.

"Pediatric Clinics of North America"; November, 1955. Philadelphia and London: W. B. Saunders Company. 9" x 6", pp. 275, with illustrations. Price: £6 15s. *per annum*.

This number consists of a symposium on pædiatric orthopædics by 20 authors who contribute 17 articles.

"Rehabilitation of a Child's Eyes", by Richard G. Scobee, B.A., M.D., F.A.C.S., revised by Herbert M. Katzin, M.D., F.A.C.S.; Second Edition; 1955. St. Louis: The C. V. Mosby Company. 8½" x 5½", with illustrations. Price: £1 11s. 6d

This book is intended for the parents of children with cross-eyes.

"'The Compend': A Compendium of Ethical and Proprietaries Used in Medicine and Pharmacy", by William Hetherington, F.P.S.; 1955. Bristol: John Wright and Sons, Limited. 7¼" x 4", pp. 706. Price: 32s. 6d.

Deals with 2500 proprietary preparations.

The Medical Journal of Australia

SATURDAY, MARCH 10, 1956.

All articles submitted for publication in this journal should be typed with double or treble spacing. Carbon copies should not be sent. Authors are requested to avoid the use of abbreviations and not to underline either words or phrases.

References to articles and books should be carefully checked. In a reference the following information should be given: surname of author, initials of author, year, full title of article, name of journal, volume, number of first page of the article. The abbreviations used for the titles of journals are those adopted by the Quarterly Cumulative Index Medicus. If a reference is made to an abstract of a paper, the name of the original journal, together with that of the journal in which the abstract has appeared, should be given with full date in each instance.

Authors who are not accustomed to preparing drawings or photographic prints for reproduction are invited to seek the advice of the Editor.

UNIVERSITY EDUCATION.

MEDICAL PRACTITIONERS, as graduates of a university and also as members of the community as a whole, should be interested in a statement made by Professor S. H. Roberts, Vice-Chancellor of the University of Sydney, and published in *The Gazette, University of Sydney*, of November, 1955. Though the statement was made on behalf of the University of Sydney, it should receive the attention of the whole body of Australians. Professor Roberts begins by stating that of all children who enter secondary schools, whether public or private, less than 5% eventually find their way to a university. He thinks that, at a conservative estimate, at least 15% of the children in each age group have the "capacity to profit from university work". He thinks that this estimate is true whether it is based on a determination of the intelligence quotient, on achievement in primary schools, or on performance in early high school years. Most children leave school at or before the examination for the Intermediate Certificate. Professor Roberts regards as more serious the fact that there is a considerable wastage among the very able—the group from whom the best honours graduates come. According to a number of careful studies in New South Wales about half the children with "exceptional potential" fail to survive even to the Leaving Certificate, and the wastage is greatest in State schools. Professor Roberts gives several reasons for what he calls this "high rate of attrition". They include feelings of inferiority at high school failure, the attraction of short-term lucrative employment, dire necessity to obtain work because of family hardship, sheer dislike of school, bad health and the pressure of family or friends. While it is true that many children take up occupations which demand further training and so do not add to the real wastage, many secure unskilled or semi-skilled jobs where full use is not made of their high capacity. Professor Roberts goes on to point out that it would be easy to show that the Australian economy could readily absorb all children of high ability if they were trained at university level. The teaching profession, in his opinion, could well employ half as many graduates again as it employs at present, and the shortages in medicine, in dentistry and in agriculture and veterinary science vary from considerable to acute. He adds that if to this are added the rapidly growing demand of industry for graduates in the sciences and the needs of expanding government research, it would be reasonable to conclude, even in strictly economic terms, that the State simply cannot afford wastage of the order described by him in its secondary schools. In Professor Roberts's opinion no problem in the community is more important than this. Let us examine the position.

Professor Roberts has stated an "educational problem"; therefore we must understand what we mean by education. In a previous discussion some years ago we stated that the process of education is one that has to do with the development of man in his physical, intellectual and moral aspects. It is a positive process and one that must continue throughout life. If a time comes when a man thinks that his education is complete, he will probably become a self-centred burden to his fellows—they will trip over him in a metaphorical fashion and he will become a bore. During his education man gradually gains an understanding of the meaning of life; he achieves his insight by a study of history and science, of philosophy and religion. His character is developed to such a degree that he is in a position to choose a course of action. If, therefore, we had to describe the purpose of education in a few words we might say that it was the building of character. Sir Richard Livingstone in his important booklet "Education for a World Adrift" wrote that the great task of the present generation was to find a principle that would rule life. Turning to university education, we find that Sir Charles Morris has stated[1] that the primary educational duty of the university is to develop the power and habit of disciplined thinking and encourage the capacity to form good judgements. The most fundamental aim in education is "the development of the power of good judgment in answering questions which cannot be answered by science but which must be answered in life—problems which no intensification of scientific training by itself will solve". While it will be readily admitted that universities have responsibilities for leadership in the community which they can never put on one side without endangering their own existence, they are not the only source of education in a community. Young, intelligent and active minds are needed in spheres of activity for which university training is not essential. If the 15% of young people to which Professor Roberts has referred as having the capacity to profit from university work were to become university undergraduates, we should soon have a lopsided community. Trade and commerce have to be served, and they need able recruits from the ranks of those who might "profit from university work". Many an executive officer in commercial undertakings will be able to testify to the general unsuitability of some graduates and their failure to "make the grade" because they are unable or

[1] Quoted in *Nature*, October 8, 1955, page 661.

unwilling to adapt themselves to new surroundings, or because they are vague and thoughtless, in other words unpractical, or because they refuse to learn. On the other hand, many a commercial figure (not necessarily the scientist who advises the management) is an educated, enterprising and valuable member of the community, though much of his wisdom has been acquired in the school of experience. So, too, a skilled tradesman, such as a linotype operator, who keeps his wits about him, who absorbs knowledge from his work as a piece of blotting paper takes up ink, can display mental qualities that a graduate might envy.

Let us now return to Professor Roberts and his less than 5% who find their way to a university. After the publication of his statement in November, 1955, it was shown to several persons including graduates and non-graduates. They all expressed the unsolicited opinion that 5% was a high figure. Some important statements relevant to the present discussion were made in 1948 in a publication by Nuffield College entitled "The Problem Facing British Universities". This document was one of a number which were issued as contributions to post-war educational policy and it emanated from the Education Sub-committee, set up originally in connexion with the social reconstruction survey undertaken by Nuffield College. It was discussed at some length in these columns on February 26, 1949; on that occasion a section dealing with the points raised by Professor Roberts was not mentioned. It was, however, pointed out that the demand for university education was not the same in all countries—the proportion of the population entering universities in Scotland was twice as large as in England, and the United States, with three times the population of Great Britain, had in 1940 thirty times the number of full-time college and university students. We declared that he would be a bold man who would maintain that university attendance was an indication of the educational standards or intellectual attainments of a country. In one section of the Nuffield College document (this was not quoted in our 1949 discussion) we read that the proportion actually attending universities of the age group in the whole population corresponding with the normal age of full-time university attendance had risen in the last generation but was still under 2%. If the proportion of the total population with an intelligence not less than that of the upper half of the student population was taken, the proportion attending universities was 5·3%. It is to be noted that Professor Roberts's percentage of less than five is that of all children entering schools. The categories from which the percentages quoted are taken are not strictly comparable, but it may reasonably be concluded that the figures given by Professor Roberts are not to be looked on as bad. Where Professor Roberts makes his best plea is when he deplores the fact that many of those who are "*very* able" fall, in his view, by the wayside. Two statements from the Nuffield College document should be quoted:

> It does not follow that the universities can meet all the educational needs of all members of the community whose education is to be carried beyond the age of 18. The great majority of occupations involve so restricted a range of theoretical or scientific knowledge that they can be taught just as effectively and much more economically in the occupation than in a university.

Professor Roberts, we may be quite certain, would agree with both these statements. The main conclusion to be drawn from what Professor Roberts writes is that no young person in the community who desires to have a university education should be debarred by social or economic reasons from obtaining it.

Finally, reference should be made to some of the "reasons" given by Professor Roberts for what he well terms the attrition. The present is an age of prosperity in which ease and comfort are sought by even the young. What is lacking today is a spirit of adventure in life and work. If this could be instilled into young people at an early age there would be no need for the community, as Professor Roberts puts it, "to encourage its most able future students to carry their formal education as far as possible" or as far as is necessary for the vocation which they choose.

Current Comment.

EARLY DETECTION OF CANCER OF THE LUNG BY ROUTINE RADIOLOGICAL SURVEYS.

THE generally disappointing results, especially in regard to operability and survival, in cancer of the lung have raised the question from time to time whether at least selected groups of persons in the community should not be advised to have, or should not be offered, a regular X-ray examination in the hope of finding early and curable lesions. Detailed clinical and radiological studies of cancer in almost all parts of the alimentary tract are so complex that the plan of regular surveys is not regarded as practicable. By contrast, a simple fluoroscopic examination or the taking of a film of the lung seems at least worthy of consideration. The section of the population affected by cancer of the lung is more clearly defined than is that with cancer of the alimentary tract. Males from the ages of forty-five to seventy years are more usually affected, and many investigators will lay stress on the fact that many of these persons have been heavy smokers. In various parts of the world, extensive surveys have been carried out, some primarily with the object of detecting tuberculosis, and others of a more general character. L. H. Garland[1] has recently reviewed surveys for the detection of cancer of the lung, and comes to some interesting conclusions. He states that photofluorographic screening procedures applied to the general population have led to the detection of about ten cases of bronchogenic carcinoma for every 100,000 persons examined. In the surveys reported to date, about 8% of shadows regarded as "tumour suspect" in films of asymptomatic adults proved to be bronchogenic carcinoma. About 24% of "solitary circumscribed shadows" in these "tumour suspect" persons proved to be carcinoma. Garland states that if the procedures were restricted to males over forty-five years of age, and were conducted every six months, the yield should be about 50 cases per 100,000 persons, especially if competent readers and dual readings were employed. To undertake a special survey in the group which Garland names would be an expensive business. There are, in this group in the United States of America, some 22,000,000 males. If examinations were made every half-year, and three views were used (a view at inspiration, a view at expiration from the front, and a view at inspiration from the lateral aspect) some 132,000,000 miniature films would be needed every year, together with the necessary million or so standard or other size films required for checking cases in which "tumour suspect" miniature films were obtained. This is just a question of hard fact, but Garland's next conclusion is not so readily understood. He states that the psychological problem of maintaining the continued interest of qualified readers in a programme of the scope needed for radiological examination of cancer of the lung "baffles the imagination". He thinks that it is not primarily a question

[1] *Am. J. Roentgenol.* (1955), 74: 402.

of funds, energy or medical manpower; it is a question of simple sustained interest, involved in a study of asymptomatic persons when the yield is so small. Everyone will agree that without qualified readers the number of missed "positives" and the number of over-read "negatives" would probably make any wide-scale survey programme useless. We cannot agree that scientific personnel would not be able to sustain their interest in this type of work. Of considerable significance is the conclusion that in several recent large surveys analysed by Garland, the prognosis in bronchogenic carcinoma detected by the survey proved little better than that of carcinoma detected by conventional methods of examining the chests of apparently symptomatic persons. Garland regards this as not surprising in view of the biological predeterminism of bronchogenic carcinoma. Lung cancer detected by a survey is unfortunately seldom in an "early" stage. Everyone will agree with Garland's conclusion that any effective screening procedure must carry with it arrangements for prompt follow-up, for completion of diagnosis and for adequate treatment. He finds that intervals of three to eighteen months tend to elapse between the making of the original tentative diagnosis and the actual therapeutic operation. This, of course, is bad. He points out that many asymptomatic persons refuse thoracotomy and that, because of the facts that he names, the major part of the potential benefit in discovering lung cancer by a screening procedure is lost. He states that a screening procedure more effective than a mass chest radiological survey is needed if a significant attack is to be made on the lung cancer problem. Until such a procedure is developed, he thinks that it is probable that half-yearly radiological examinations of persons over forty-five years of age could be recommended, especially if they were willing to submit promptly to any surgical procedure which was found necessary in the event of the discovery of a culpable shadow. However, he adds that the yield in lives actually saved or even made more comfortable by such a programme appears in the light of known curative or palliative techniques to be so small that its imposition could not be urged on the general public. "It would result in much apprehension on the part of the many 'false' positives and, in all honesty, it would not save many lives." It would be interesting to have the opinion of Australian physicians and radiologists on this question.

ESPERANTO OR INTERLINGUA?

"LANGUAGE is a city to the building of which every human being brought a stone", wrote Emerson in his "Letters and Social Aims". If this is so, it possibly accounts for the great diversity of the linguistic edifices that have been erected during man's centuries of speaking existence. The most obvious method of bridging a gulf between people speaking different languages is the study of one or more foreign tongues; but this is for obvious reasons self-limiting. Then the idea arose of an international language, to be deliberately built up. An early reference to such a proposal is to be found in a letter from Descartes to Father Mersenne, written on November 20, 1629. Hundreds of such languages have been proposed in the course of the last two or three centuries; but none has received official and universal acceptance. In 1954. the January issue of *Blood* inaugurated the policy of publishing summaries of its original articles in Interlingua, and this fact was noted in this journal,[1] and some account of Interlingua was given. In an article entitled "*De Motu Interlinguæ*", A. Plichet[2] discussed the present position of Interlingua, and reported that two scientific journals were published in Interlingua (*Scientia International* and *Spectroscopia Molecular*) and that a number were publishing summaries in that language. Plichet also stated that Interlingua grammars had been published in Switzerland for the use of both French-speaking and German-speaking persons, and that a course in Interlingua had been established at the University of New York. At the second World Congress of Cardiology in Washington in 1954 the summaries of all the transactions were published in Interlingua, and at the International Congress of Hæmatology in Paris, also held in 1954, the president's address was published in that language. Plichet wondered whether Interlingua was gradually assuming the important position that Latin had held in previous centuries. He expressed the opinion that this new form of Latin could make possible a better and speedier dissemination of scientific and medical information. Rather plaintively he concluded his paper by expressing the hope that the use of the new language would develop, and that as a result French work would be noted in Anglo-Saxon journals more frequently than at present.

If we are to judge from a further statement by Plichet,[1] this apparently harmless championship of the newest international language brought about his ears a hornet's nest of indignant correspondence from the supporters of Esperanto. He remarks that "we did not suspect that the language of Dr. Zamenhof had so many experts among doctors". By way of making amends for the unintended injustice, it was arranged that an article on Esperanto should be obtained and published; such an article would not be out of place in a medical journal, since the founder of Esperanto, Dr. Zamenhof, was a Polish ophthalmologist. The article is by Dr. Pierre Berlot,[2] who for many years was translator of scientific papers for the National Research Centre. In the course of his paper Berlot points out that Esperanto has thousands of supporters all over the world. (Australia is represented amongst the interested countries.) He gives brief details of the history of the language, which now extends over sixty years, and states that Esperanto has shown that it is capable of fulfilling the role of an auxiliary international language in all spheres of human activity. A fairly comprehensive résumé of the way in which the language is built up, and of the grammar, is also given. His summing up of the relative merits of Esperanto and Interlingua is worth consideration. He states that Interlingua is nothing but simplified Latin. If its grammar has been freed from all useless complications—which he holds has been accomplished at the cost of precision of style—none the less there remains the obstacle of vocabulary. Moreover, if a simplified form of Latin can be relatively easily adapted to medical material full of technical expressions whose meaning is fairly obvious to the reader, it is doubtful whether such a language could be so satisfactorily adapted to other techniques or disciplines without very considerable alteration. Berlot thinks that this has been overlooked by the promoters of Interlingua, and that they have also overlooked the fact that an international idiom, if it is to be really useful, must be capable of being employed by the people of all nations in all spheres of activity. Such a language must be able to be taught to the children of all countries, without prejudice to their mother tongue and to their other studies, so that, having more than a purely practical aspect, it will tend towards mutual understanding among the nations. A short passage in Esperanto (taken from *Journal de médecine de Lyon*, June 20, 1955) with its translation is then given. A little of this may well be reproduced here:

> La doloroj de la nasko. Origino kaj vastigho de la doloroj de la dilatigho.
>
> La nunaj klinikaj kaj fiziologiaj studoj kontribuis iom lumigi la malfacilan problemon de la origino kaj de la vastigho de la doloroj ligataj al la dilatigho de la kolo dum la nasko.
>
> Origine estas la utera strecho; chi-lasta, perage sur la nervaj finoj de la kolo, aŭ periskemie, kio estas aparte doloriga, estas nepra en la kreo de doloro. Sed ghi ne sufichas: la utero povas strechighi ne dolorige, 2 aliaj faktoroj ludas helpan rolon: la utera pleneco kaj la rezisto de la kolo kiu kontraŭstaras la malplenigon de la utero.

This may be translated as follows:

> The pains of labour. Source and diffusion of the pains of dilatation.
>
> Recent clinical and physiological studies have succeeded in throwing a certain amount of light on the

[1] M. J. AUSTRALIA, July 3, 1954.
[2] *Presse méd.*, September 24, 1955.

[1] *Presse méd.*, December 14, 1955.
[2] *Ibidem.*

difficult problem of the origin and diffusion of the pain associated with dilatation of the cervix during labour.

The origin is in uterine contraction; this, acting on the nerve endings in the cervix, or through ischæmia (the particularly painful character of which is known) is essential to the production of the pain. But it is not sufficient, for the uterus can contract painlessly; two other factors play an auxiliary role: the fullness of the uterus and the resistance of the cervix, which resists the evacuation of the uterine contents.

In the "Current Comment" on Interlingua published in this journal in 1954, we reproduced a passage in that language with its translation. Those interested will find it profitable to compare this with the passage in Esperanto quoted above. It is obvious that Interlingua is much easier to read at sight; but it may well be true, as Berlot holds, that Esperanto provides for the expression of subtler shades of meaning and thus makes for greater accuracy. Perhaps both of these "supranational" languages have parts to play, each in a different sphere. However, even if the need for such a language is accepted, there will be many medical practitioners who would rather devote their limited spare time to the study of one or other of the national tongues, so that they may be enabled to go beyond the purely utilitarian paths of scientific and technical information and enter the rich treasure-houses of national literature and tradition.

THE TOXICITY OF IRON COMPOUNDS.

IRON as a medicament has a remarkable history. It seems to have been used almost as far back as medicine can be traced and certainly among the ancient Hindus, Egyptians and Greeks, according to a review article by J. O. Hoppe, G. M. A. Marcelli and M. L. Tainter;[1] yet it remains an indispensable agent in modern treatment, within the well-defined limits of its replacement value. One of the most curious episodes in its long therapeutic history was its virtual eclipse in the earlier part of this century. Hoppe, Marcelli and Tainter state that this was due to the influence of certain investigators, who convinced physicians that inorganic iron was hardly absorbed at all, coupled with the unsatisfactory results of injudicious use of iron in all types of anæmia. At the same time, cases of poisoning from iron salts became rare, and the safety of orally administered iron became generally accepted. Then it was shown that orally administered iron was used in the body, and iron salts returned to general and even extravagant use. The next development was the reporting of a number of cases of fatal accidental poisoning in children from ingestion of ferrous sulphate tablets, and surprise was expressed that this toxicity had not been appreciated earlier. In fact, according to a series of references cited by Hoppe, Marcelli and Tainter, many Continental clinicians and investigators in the mid-nineteenth century had been well aware of the toxic properties of iron salts in overdosage, but this literature seems to have been overlooked.

It seems clear that "the oral toxicity of iron compounds is not a function of the iron content alone, but is dependent upon the particular salt as well". Last year we reviewed in these columns[2] a series of reports of poisoning from the use of ferrous sulphate, pointing out that the margin between therapeutic and toxic doses is smaller than is generally assumed. From a review of the literature, Hoppe, Marcelli and Tainter are able to state that most reported poisonings due to iron salts occurring in man are caused by ferrous sulphate. Of 63 cases reported as due to this salt, 23 ended fatally. Fatal dosages of ferrous sulphate ranged from 40 to 1600 milligrammes per kilogram of body weight, with an average value of 900 milligrammes per kilogram. A smaller number of cases of poisoning (some of them fatal) have been reported from ingestion of ferrous chloride, ferric chloride and ferric ammonium citrate. The incidence of poisoning is obviously related more to availability of the poison than to its poisonous quality, because animal experiments have shown that ferric ammonium citrate is about as lethal as ferrous sulphate, and both ferric and ferrous chloride are appreciably more lethal. On the other hand, no cases of poisoning from ingestion of ferrous gluconate appear to have been reported, and it is clearly less irritating and less toxic than ferrous sulphate when considered from the standpoint of the total weight of drug administered or in terms of their iron contents. This was established in an experimental study by Hoppe, Marcelli and Tainter appearing separately in the same issue of *The American Journal of the Medical Sciences* as the review article already mentioned. They state that a firm experimental basis appears to be demonstrable, first, for lack of clinical toxicity of ferrous gluconate and, second, for therapeutic preference for this form of iron.

Ferrous carbonate, which entered on a long period of popularity with the introduction of Blaud's pill in 1831, is not used today as much as in the past. It receives scant reference in Hoppe, Marcelli and Tainter's review of the iron compounds, but figures quoted from animal experiments indicate that it is very much less toxic than any other iron salts listed. However, there is no particular reason to believe that it will recover its former therapeutic popularity. Another salt not listed by Hoppe, Marcelli and Tainter is ferrous succinate. From experience in the treatment of 150 patients suffering from various forms of hypochromic anæmia R. O. Gillespy[1] has reported a satisfactory therapeutic response to ferrous succinate (in the form of "Ferromyn") in most cases. In preliminary animal experiments it was found that no toxic reaction followed intraperitoneal injection of ferrous succinate, although it was given in a strength 25% higher than the lethal dose of ferrous gluconate, which was used as the control. It appears to be, in Gillespy's words, a useful additional compound in the treatment of all forms of hypochromic anæmia.

RADIOTHERAPY AND MALIGNANT DISEASE.

MEDICINE has been a little slow to make full use of radiotherapy in the treatment of malignant diseases. There is no obvious drama either in the use of the penetrating and invisible power of the high-voltage X-ray apparatus, or in the disintegrating radiations of radioactive isotopes. On the other hand, surgery is practical and apparent and the disease is removed as a physical entity. Patient and surgeon alike may find satisfaction in the cleansing by expurgation. Radiotherapy is a precise mathematical science in which the inexpert may work havoc, and in which mistakes are irreversible. If radiotherapy is to overcome the prejudice against it, there must be adequate proof that radiotherapists can safely obtain more cures of cancer, either with or without the aid of surgery. R. Paterson[2] has recently discussed the role of radiotherapy in the treatment of malignant disease. He suggests that in the palliation of incurable cancer, surgery, with such exceptions as colostomy and tracheotomy, has little real value, while radiotherapy, by inducing the restraint of growth, may relieve pain and usefully prolong life. Cancer of the lung, usually incurable, is greatly relieved in symptoms for a time. Curative radiotherapy will give excellent results in many malignant conditions, providing that due care and precision are used in its application.

Radiotherapy now provides a method of control of those radiosensitive growths which were formerly untreatable. The main examples of this type of malignant disease are lymphosarcoma, reticulosarcoma, lymphoepithelioma of the naso-pharynx, a few thyroid tumours, Wilms's tumour of the kidney, medulloblastoma, *seminoma testis* and dysgerminoma. They are easy to cure if small, and radiotherapy can still be used if widespread extension has taken place. The allied malignant conditions of the blood may be treated only palliatively. Figures from the Manchester centre indicate a high rate of five-year survivals in all the previously mentioned radiosensitive

[1] *Am. J. M. Sc.*, November, 1955.
[2] M. J. AUSTRALIA, May 7, 1955.

[1] *Med. Illust.*, March, 1955.
[2] *South African M. J.*, December, 1955.

tumours, with appreciable success even when local metastases were found.

In treatment of cancer of the breast, radiotherapy is to some extent taking the place of surgery, and in advanced cases, combined with radical surgery, will provide hope of a cure when there was previously none. Paterson believes that because of its efficiency and preferable cosmetic result, radiotherapy alone is the treatment of choice in cancer of the skin, the mouth and lip and also of the *cervix uteri* and the bladder. For these neoplastic conditions radiotherapy has largely replaced surgery in the Manchester area, especially in cancer of the mouth by judicious intraoral radium or other techniques. In the treatment of carcinoma of the bladder five-year cures may be obtained in almost 50% of cases by use of a radioactive implant; by X-ray therapy of the megavolt, deep or ordinary types; or by use of a radioactive bladder-balloon. In these circumstances surgical operation is indicated only when recurrence takes place.

In a separate paper, Paterson deals with treatment priorities of carcinoma of the *cervix uteri*. In his opinion radiotherapy alone gives better results than surgery. The cure rate in early stages is higher if radiotherapy is used, and this method also makes possible the cure of some patients in whom the condition is inoperable. Paterson suggests that surgical techniques for the wide removal of spreading cancers of the cervix are not the most suitable when radiotherapy is not only more efficient, but more comfortable for the patient. Surgical treatment should be reserved for those few radioresistant but operable carcinomata in which recurrence takes place after radiation treatment. The aim of radiotherapy is to apply a high dosage of radiation to a small volume within the limits of tissue tolerance. For radiotherapy, a high degree of specialized skill must be backed by elaborate equipment and an experienced lay staff, including a physicist. The growing faith of British medicine in radiotherapy is shown by the fact that, according to Paterson, radiotherapy for cancer as a whole is nowadays used more than surgery.

AMŒBIC HEPATITIS.

AMŒBIASIS, though a very widespread and relatively common disease, is not a very prominent one, and many doctors go through their whole careers without ever diagnosing a case. Many see an occasional case of frank amœbic dysentery. When an amœbic abscess of the liver crops up, it is an event; this is one of the more difficult diagnoses to make *ab initio*, while the remorseless inroads amœbic hepatitis makes on the patient's condition once it becomes active, the speed with which the subsequent abscess advances, and the dramatic results of simple therapeutic measures, all combine to make this condition a noteworthy one. The diagnosis of even quite large amœbic abscesses is too often made only at autopsy; the preceding amœbic hepatitis is rarely diagnosed at all except in areas of heavy endemicity—yet early diagnosis, before the stage of abscess formation, saves the patient much serious illness. It is most unfortunate, therefore, that fallacious reasoning in a recent paper on amœbic hepatitis by B. H. Kean[1] has resulted in a conclusion's being reached which might seriously mislead many who are unfamiliar with the condition. Kean has reviewed sections of liver obtained at 4478 consecutive autopsies in the Panama Canal Zone, where amœbiasis is very common, together with sections from 148 members of the United States Armed Services who died of amœbiasis, and material obtained by biopsy of the livers of 50 patients considered to be suffering from hepatic amœbiasis. In none of these specimens was *Entamœba histolytica* present, nor was there any specific diffuse lesion identifiable as amœbic hepatitis. Kean has therefore concluded that "the clinical syndrome of amebic hepatitis may be due to [absorption from] ulceration of the intestinal tract or other causes, but in the absence of positive evidence of anatomical changes in the liver it cannot be regarded at the present time as a specific entity". This sweeping and rather startling statement, however, loses weight when it is considered in relation to Kean's definition of amœbic hepatitis: "Hepatomegaly, hepatic tenderness, slight to moderate fever, moderate leucocytosis, and laboratory evidence of hepatic dysfunction in a patient with a history of intestinal amebiasis. An important feature is response to specific antiamebic therapy. The lesion in the liver is assumed to be a diffuse hepatitis caused by *Endamœba histolytica* in contrast to the classic localized amebic abscess." Elsewhere Kean specifies that amœbic hepatitis "may be considered a diffuse lesion, involving all lobes and most lobules, and its *sine qua non* is that it is caused by *E. histolytica*, which should be demonstrable". It would be interesting to know how Kean arrived at this definition. He obviously did not learn it from clinical observation, or from standard text-books, while his pathological investigations have merely succeeded in demonstrating that a diffuse condition such as he had defined does not exist—from which it would have been logical for him to have concluded that his definition was incorrect. Apart from the fact that his conception of a diffuse lesion, with all lobes and most lobules invaded by *E. histolytica*, is at variance with all observations, "hepatomegaly" *tout court* is not a happy term—there is swelling of the affected area, and compensatory hypertrophy of the left lobe if much of the right lobe is put out of action; tenderness is usually elicited only if the affected area is reasonably within reach of the exploring finger tips; and a history of intestinal amœbiasis is more often wanting than present.

[1] *Arch. Int. Med.*, November, 1955.

ENDOMETRIAL CARCINOMA.

CARCINOMA of the endometrium is one of the more variable of malignant conditions. The behaviour, both of the primary tumour and of its secondaries, varies from patient to patient so that an evaluation of the results of treatment is difficult unless a large series of cases is studied. H. B. Bourne, J. P. A. Latour and N. W. Philpott[1] have reviewed 306 patients diagnosed between 1926 and 1953 as suffering from carcinoma of the endometrium, and treated at the Royal Victoria Montreal Maternity Hospital. The authors form the impression that the number of these cases is increasing and that the disease appears to be primarily one of the better economic groups. The incidence, according to age, rises markedly after the age of forty-five years, and from then remains at a fairly even distribution. The authors insist that any irregular uterine bleeding after the age of forty should be very carefully investigated and not dismissed as simply menopausal in origin. Both *diabetes mellitus* and cardio-vascular disease seem to be commoner than usual in patients with endometrial carcinoma. The incidence of infertility is three times as high as for normal women, and this may be referable to a common underlying factor of endocrine imbalance. The authors are of the opinion that cytological examination of vaginal smears and cervical scrapings is a useful diagnostic aid, but has no negative value. In the treatment by radiotherapy it is the authors' practice to use a minimal radium dosage of 4500 milligramme hours. Any surgical treatment takes place six weeks after the radiotherapy. The authors state that in highly specialized centres the treatment of choice for adenocarcinoma of the endometrium is radiotherapy alone. However, in general, surgery alone appears to give more effective five-year survival than radiotherapy alone. Deep X-ray therapy may be employed in addition to the intrauterine implantation of radium. From 1926 to 1948 the survival rate of patients who underwent surgical treatment, with or without radiotherapy, was 69%. This compared with the 52·9% five-year survival among patients treated only by radiotherapy. The issue is a little clouded by the tendency to use radiotherapy alone in advanced cases of carcinoma of the endometrium. An attempt to evaluate the different methods of treatment at the various stages of the carcinoma still leaves a better result where surgical treatment was instituted. The authors concluded that radical hysterectomy and lymphadenectomy should be performed whenever possible.

[1] *Surg., Gynec. & Obst.*, December, 1955.

Abstracts from Medical Literature.

OPHTHALMOLOGY.

Strabismus Surgery.

F. D. COSTENBADER AND D. R. BAIT (*Arch. Ophth.*, November, 1954) undertook a study to show whether monocular or binocular squint surgery yielded a higher percentage of comitance, and whether this affected the final outcome of treatment. They studied 665 patients, who represented three groups: one group had corresponding muscles in the two eyes operated upon at the same time; the second group underwent monocular surgery, and at a later date a similar procedure was performed on the opposite eye; the third group underwent monocular surgery only. The authors were able to conclude that comitance is the rule with simultaneous symmetrical binocular surgery. In the second group incomitance followed in a large percentage of cases after the first operation, but comitance followed in most cases after similar surgery on the second eye. In the third group, with its monocular surgery, 50% of patients had incomitance. The authors also noted that many patients had some asymmetry following monocular surgery, and also that convergence was no more unfavourably influenced by conservative recession of both medial recti than by recession and resection in one eye only. They found that bilateral resection was a disappointing procedure.

Surgical Management of Non-Paralytic Exotropia.

R. D. MULBERGER AND P. R. MCDONALD (*Arch. Ophth.*, November, 1954) discuss exotropia and its surgical management. They state that all intermittent exotropias sufficient to cause symptoms or to be cosmetically noticeable should be treated surgically, the operation of choice being bilateral recession of the lateral recti to the equator. Alternating exotropia should be treated by bilateral recession of the lateral recti if the angle is small, and by bilateral resection of the internal recti in larger degrees of squint; in some cases both procedures may be required but not at the same time. In cases of constant exotropia surgery is usually confined to the divergent eye. The treatment of post-operative exotropia is more difficult; more surgery is required to adjust an overcorrected exotropia than is necessary to produce the overcorrection in the first place.

Ophthalmological Changes Produced by Pituitary Tumours.

M. CHAMLIN *et alii* (*Am. J. Ophth.*, September, 1955) review 156 cases of pituitary adenomata and cranio-pharyngiomata. As a result of their study they found that the commonest ocular signs in order of their frequency were visual field defects, atrophy of the optic disks, loss of central vision, extraocular muscle palsies, pupillary changes, involvement of the fifth cranial nerve, papilloedema, proptosis and nystagmus. Visual field defects occurred in 86% of patients with pituitary tumours, but the finding was most helpful in relation to chromophobe adenomata and cranio-pharyngiomata. In basophile and eosinophile adenomata the clinical findings allowed of a diagnosis without confirmatory field defects. In basophile adenomata and cranio-pharyngiomata 97% of the patients had bitemporal hemianopsia. Optic atrophy eventually takes place in those eyes that show bitemporal hemianopsia. However, this is only a confirmatory sign of visual loss and an indication of its duration. Lack of atrophy does not rule out any chiasmal pressure, inasmuch as visual field loss may be found before optic atrophy develops. As regards the visual acuity in these patients, the authors found that of 312 eyes, 32% had some loss of acuity. Of the patients reviewed 5% had extraocular muscle palsies and all occurred in association with chromophobe adenomata. One patient had pupillary changes, and another had fifth cranial nerve involvement as shown by the loss of corneal sensation. Papilloedema is characteristically absent, and no patient had nystagmus.

The "Priscoline" Provocative Test.

S. SUGAR AND R. SANTOS (*Am. J. Ophth.*, October, 1955) undertook a study of the "Priscoline" test for glaucoma. Of 30 eyes with known simple glaucoma in which operation had not been performed, the result of the test was positive in 46·6%. In six successfully operated eyes the result of the test was negative in all cases. The authors consider the test inferior to the water drinking test.

Malignant Melanoma and Subretinal Fluid Studies.

L. CHRISTENSEN AND G. E. ROWERI (*Arch. Ophth.*, October, 1955) review the method of diagnosing intraocular melanoma by the technique of examination of subretinal fluid. They examined 83 specimens and were able to demonstrate tumour cells in 45 of them. They had difficulty in differentiating tumour cells from histiocytes. The examination of four eyes which had previously undergone puncture some weeks previously revealed extraocular extension of the tumour. The authors do not recommend the method as a means of diagnosing intraocular malignant melanoma.

Studies on the Ætiological Problem of Uveitis.

C. SMITH AND N. ASHTON (*Brit. J. Ophth.*, September, 1955) carried out a number of investigations in a series of cases of uveitis in an endeavour to determine the ætiology of the infection. The methods of study consisted of comparing blood and serological findings in uveitis with the findings in a control group, observing the response of lesions to specific therapy, and attempting to isolate infective agents from the eye. Two hundred patients were investigated; the results of Wassermann and Kahn tests were negative in all, and the result of the gonococcal complement fixation test was positive in two. The Mantoux finding was positive in a percentage in agreement with the percentage found in the general population. The only value of the Mantoux test was in excluding tuberculosis and in demonstrating anergy to tuberculoprotein in sarcoidosis. A normal blood count was the rule. Brucella agglutination tests were performed in 103 cases with two positive results. Toxoplasmosis was tested for by the cytoplasm-modifying test and the complement fixation test. The test was performed in 198 cases with serological evidence of infection in 87 cases. The results of antistreptolysin assays indicated that in a certain proportion of cases the condition is associated with streptococcal infection.

Digital Pressure in Cataract Surgery.

R. E. KIRSCH AND W. STEINMAN (*Arch. Ophth.*, November, 1955) from a study of cataract surgery, with and without the use of digital pressure over the eyeball, conclude that the use of this procedure greatly reduces intravitreal pressure and the incidence of vitreous loss. After the retrobulbar injection of anæsthetic the authors advise that firm pressure should be maintained over the closed eye for exactly five minutes. The pressure should be released for two seconds every half minute to insure against occlusion of the retinal vessels. In 100 consecutive cataract extractions in which pressure was applied in no case was there loss of vitreous.

Sedation for Ophthalmic Surgery.

R. A. BUEN *et alii* (*Brit. J. Ophth.*, June, 1955) report on the use of chlorpromazine, promexathine and pethidine in ocular surgery. When the intravenous route is used, the drugs are given twenty to thirty minutes before the operation. The dose of all three substances is diluted in 20 millilitres of saline and injected very slowly. When the intramuscular route is used, the dose is given one to two hours before operation. Local anæsthesia is used with this sedation. The patients lie quietly and appear to be asleep. There is pallor of the face and the skin is cold to touch. A fall in both systolic and diastolic blood pressure is the rule. When the intravenous route is used, there may be severe temporary tachycardia unless the injection is given very slowly. During operation the patients appear to be asleep; they are relaxed mentally and physically. The immediate post-operative recovery of these patients is satisfactory. If undisturbed, they sleep until the morning after the operation. The authors consider this method of sedation far superior to any other when ocular operations are to be performed under local anæsthesia.

Ocular Findings in Cerebral Palsy.

A. S. BREAKEY (*Arch. Ophth.*, June, 1955) has reviewed 100 unselected patients with cerebral palsy. Of these 56% had abnormal ocular findings. Abnormalities of muscle balance were the most prominent; 40% had esotropia, and 8% had exotropia. Such developmental defects as coloboma of the iris, congenital cataract and optic atrophy

were found in 6%. The eye manifestations give no clue as to whether the child is spastic, dyskinesic or ataxic. In the treatment of the muscle imbalance in these children generally accepted principles can be applied, including surgical treatment, provided that the deviation is relatively constant.

A New Scleral Shortening Operation.

W. G. EVERETT (*Arch. Ophth.*, June, 1955), in a preliminary report, describes a new technique for scleral shortening. The new shortening procedure entails folding of the sclera outwards. The author describes his technique, which is very simple; however, no evaluation of the technique is yet possible as patients have not been followed long enough.

OTO-RHINO-LARYNGOLOGY.

Complications of Post-Nasal Packing for Epistaxis.

A. J. KUHN AND O. E. HALLBERG (*Arch. Otolaryng.*, July, 1955) state that the usual post-nasal pack is of such size as to fill the nasopharynx snugly. It usually covers the orifices of the Eustachian tubes and lies on the superior surface of the soft palate. In essence it is a nasopharyngeal plug held in place against the posterior nasal orifices. As such, it does not enter the nose, and can serve only to close the posterior choanæ tightly. Such a pack may serve for severe hæmorrhage following adenoidectomy, but not for epistaxis. This type of pack occasionally causes complications such as laceration of the nasal floor or of the soft palate, hæmotympanum or œdema of the pharynx and larynx. Pain is more severe with a large post-nasal pack, and occasionally it may cause harmful secondary effects from pressure on the surrounding tissues. Cone-shaped packs, inserted with the apex forward, and having a base a little larger than the posterior choana, are deemed more practical, for when drawn forward the base becomes firmly wedged into the choana. The cone-shaped pack is inserted in the usual manner by means of a lubricated catheter passed through the nose. Traction is maintained by the use of two anterior strings, which are tied over a piece of tubing or dental roll at the anterior naris, so that the plug is drawn into the posterior choana and a moderate pull is provided. Such a pack may be left in place for up to a week without serious sequelæ. Advantages are that the opposite side of the nose may be left open, and pain and discomfort are much less. It is less likely to cause middle ear complications, as it does not cover the Eustachian orifice.

Ligation of Both External Carotid Arteries.

A. J. KUHN AND O. E. HALLBERG (*Arch. Otolaryng.*, August, 1955) state that the arterial blood supply to the nose is from two major sources: the internal carotid system through the anterior and posterior ethmoid arteries and the external carotid system through branches of the spheno-palatine, superior labial and descending palatine arteries. The middle turbinate is regarded clinically as a dividing line between the two systems of supply; bleeding from above that structure originates in an area of the ethmoid supply, and bleeding from below it originates from areas supplied by the external carotid. Ligations indicated may be of the septal branch of the superior labial artery, of the posterior ethmoidal artery, of the anterior ethmoidal artery and of the external carotid artery in the neck. Occasionally, the internal maxillary artery may be tied in the pterygo-maxillary fossa via a transantral approach. Ligation of the internal or the common carotid artery is mentioned only to be condemned. Multiple ligations are occasionally necessary, and usually involve the external carotid and anterior ethmoidal arteries of the same side. Ligation of both external carotid arteries for nasal epistaxis is apparently unusual. Two cases are described in which this bilateral ligation was required. In one case the external carotid was tied on one side with good effect, but recurrent hæmorrhage seven months later, from the opposite side, required external carotid ligation on that side also. In the second case one external carotid artery was tied, but five hours later recurrent severe bleeding enforced a similar ligation of the opposite external carotid as well. In neither case were there any untoward sequelæ. Apparently the collateral blood supply of the nose is extensive and is rapidly and effectively established from within and without, and from the same and from the opposite side. It is for this reason that occasionally there may be failure to control bleeding even by arterial ligation.

The Surgical Treatment of Chronic Frontal Sinusitis.

A. R. BERGARA AND A. O. ITOIZ (*Arch. Otolaryng.*, June, 1955) state that chronic frontal sinusitis is almost always a result of extension of maxillary sinusitis through the ethmoid; therefore the infection of these cavities should be treated as one. The first attempt at treatment of chronic frontal sinusitis should be endonasal, its objective being to provide for good drainage of secretion. In spite of the existence of a patent naso-frontal duct, most cases of sinusitis remain in a chronic stage, and only an external operation can cure it. To treat a frontal sinus effectively it is necessary to have a good exposure of the cavity and its diverticula and of the ethmoid. This is possible only through a large resection of the anterior wall of the sinus. To obtain good æsthetic results an osteoplastic flap, which includes as much as possible of the anterior wall of the sinus, is turned downwards. The only sure way of avoiding recrudescence is through obliteration of the sinus. To this end the curetted and cleaned cavity is filled with fatty tissue taken from the abdominal wall. This autograft attaches itself to the sinus walls, completely filling the cavity and its prolongations. It finally undergoes a partial fibrous transformation. The incision, made in the eyebrow, includes skin and subcutaneous tissue only. The superior flap is undermined to a little beyond the peripheral limits of the sinus. Bleeding may be considerable and is controlled by ligation of main vessels and by diathermy. An œsteoplastic flap, representing as much as possible of the anterior sinus wall, is outlined through a succession of burr holes located by successive probing through each preceding hole until the sinus is outlined. The burr holes are then joined with a cutting burr. Finally, the flap is fractured at its lower edge and turned downwards, hinged by the remaining periosteum. Very careful extirpation of the mucous membrane is carried out, and the sinus walls are lightly curetted. The ethmoid cells are carefully identified and completely exenterated. The sinus is then filled with fatty tissue taken from the abdominal wall of the patient. No drainage into the nose is necessary. The osteoplastic flap is sutured back into position, and the external wound is closed. Experimental studies of this procedure in dogs revealed that after three months the fresh fatty implant remained of a fatty nature and completely filled the cavity. A similar graft which had been boiled for five minutes before implantation had undergone an osteo-fibrous transformation. The method has been used in 104 cases of chronic sinusitis with good results. In two of these, reopening was necessary for small focal residual infection, and opportunity was taken to study the previously implanted fatty tissue. In each instance the graft was healthy, firmly adherent and well vascularized in spite of the adjacent infected foci. Undoubtedly the results obtained have been materially assisted by the antibiotics.

Plastic Œsophageal Tube.

N. W. MONTGOMERY (*Ann. Otol., Rhin. & Laryng.*, June, 1955) states that the prolonged use of a feeding tube during the period of reconstruction following resection of the cervical part of the œsophagus is often a problem for both patient and physician. A polythene tube has been used with success as an artificial cervical œsophagus linking the hypopharyngeal stoma to the opening of the œsophagus lower in the neck. The upper end of the tube must be moulded so that food and liquids will not leak down its sides. It must also be shaped to prevent its sliding down the œsophagus during the act of swallowing, or creeping up into the pharynx, where it would cause gagging and retching. The lumen must be of sufficient diameter to allow the passage of well masticated food. The basic material for the construction of this cervical œsophageal tube is animal-tested polythene tubing of 9·5 millimetres inside diameter and 12·5 millimetres outside diameter. A length of tubing of about seven to eight inches is required. This tubing is able to be expanded to a funnel at its upper end, or constricted and curved where necessary by treatment under boiling water followed by rapid cooling. The appropriately moulded tube is inserted through the upper opening via the pharynx; thence it is passed down and inserted into the lower part of the œsophagus. The moulded upper end is pushed tightly into the pharyngeal stoma. In one case the patient's entire nourishment for more than eleven months was accomplished by the use of the feeding tubes. He received an adequate diet from his own mastication.

Special Articles.

(Contributed by Request.)

THE PRESENT POSITION OF ANTIBIOTIC THERAPY.

In November, 1955, the third annual symposium on antibiotics was held in Washington, D.C. These symposia were inaugurated in 1953 by the United States Department of Health, Education and Welfare, Food and Drug Administration, Division of Antibiotics, and are are held under the chairmanship of Henry Welch, Ph.D., in collaboration with the journals *Antibiotics and Chemotherapy* and *Antibiotic Medicine*. At these symposia speakers from the United States of America, Great Britain, Europe and other countries are given the opportunity of presenting summaries of work carried out with antibiotics at present in use and of reporting progress in the discovery of new antibiotics.

At the symposium of 1955 reports were given on several new antibiotics which either are in the initial experimental stage or are undergoing clinical trial.

Cycloserine is a new antibiotic, which is said to be effective *in vitro* against *Mycobacterium tuberculosis*. This antibiotic has been used in 99 cases of pulmonary tuberculosis and in three cases of laryngeal, two cases of hæmatogenous, one case of miliary and three cases of glandular tuberculosis. Several authors report encouraging results, and it is said that no resistance of the organism to the antibiotic has as yet been demonstrated. Cycloserine is active *in vitro* against Gram-negative and Gram-positive bacteria. It has been used in the treatment of gonorrhœa without success. The antibiotic has also been tried against a wide range of organisms with variable results. It is reported to be of use in the treatment of stubborn urinary tract infections. Toxic reactions have been noted which consist of drowsiness, dizziness and headaches. The place of cycloserine in the antibiotic armamentarium is as yet uncertain.

Rovamycin is a new antibiotic produced by a strain of *Streptomyces ambofaciens*. It is effective against Gram-positive bacteria and Neisseria. This new antibiotic after adequate trial may prove to be useful in the treatment of staphylococcal infections resistant to other antibiotics.

Eulicin is a new and potentially useful antifungal agent obtained from culture filtrates of a Streptomyces similar to *Streptomyces parvus*. Its effect *in vivo* has not yet been determined.

Thiostrepton is a new crystalline antibiotic isolated from a fermentation broth prepared with a species of Streptomyces isolated from soil. The in-vitro spectrum indicates activity against Gram-positive bacteria. Thiostrepton seems to be effective against organisms resistant to the other antibiotics. The antibiotic is primarily bacteriostatic, and resistance does develop. Its use *in vitro* has not been fully determined.

Vancomycin is the name given to a new antibiotic produced by a new species of the Streptomyces genus, *Streptomyces orientalis*, isolated from soil from Indonesia. This new antibiotic has been prepared in the Lilly Research Laboratories. The in-vitro activity of this antibiotic is characterized by a lack of development of resistance in strains of *Staphylococcus aureus*. It will also inhibit strains of *Staphylococcus aureus* resistant to other antibiotics. The antibiotic is undergoing extensive clinical trial at present, and the results of this trial are awaited with interest.

Streptonivicin is an antibiotic produced by *Streptomyces niveus*. It is reported to be active against Gram-positive and Gram-negative organisms. Clinical trials are being carried out.

Mycostatin (nystatin) is derived from *Streptomyces noursei*. It is active against yeast-like fungi in the actively growing state. It is inactive against bacteria. It has been shown that *in vivo* this antibiotic has a beneficial effect in the treatment of local lesions due to *Candida albicans*. It is of doubtful value in systemic moniliasis.

Mycosteclin is a combination of tetracycline and mycostatin. The claim for this antibiotic is that the addition of mycostatin reduces the risk of superinfection with *Candida albicans* during prolonged tetracycline therapy. This has yet to be proved, as has also the fact that monilial infection does arise as a result of prolonged therapy with broad-spectrum antibiotics.

Penicillin V (phenoxymethyl penicillin) represents the most important recent advance in antibiotic therapy. Penicillin V originated in Austria and has been under trial in that country for the past three years. It has also undergone extensive clinical trial in America. Penicillin V is a new salt of penicillin which is used for oral therapy. It has a distinct advantage in this field over oral penicillin G in that, because of its greater stability in an acid medium, much higher blood levels are obtained with the usual dosage of 200,000 units. However, with higher dosage there is not the same marked difference in the serum levels obtained. It is thought that penicillin V will replace penicillin G for oral therapy where such therapy is advisable. It is current thought also that oral penicillin therapy will not replace injectable penicillin. Penicillin V at the moment is much more expensive than penicillin G.

The use of vitamins in conjunction with the broad spectrum antibiotics is said to reduce the incidence of certain side reactions, such as fissures of the mouth and tongue, diarrhœa and anal pruritus. Combined preparations of tetracyclines and vitamins are now available.

It will be seen, therefore, that except for penicillin V there are no new antibiotics which have progressed beyond either the experimental or the initial clinical trial stage. The current problem is how best to reorientate the use of existing antibiotics to deal with the problem of resistant strains of organisms.

No one would question the important role that antibiotics have and will always have in the treatment of diseases caused by microorganisms. It is becoming increasingly evident, however, as our knowledge of the antibiotics grows, that antibiotics are dangerous weapons, to be handled with understanding and discretion. This is illustrated by the high incidence of antibiotic-resistant strains of organisms, the high incidence of toxic reactions with reports of death and the increasing number of patients with bacterial infection which does not respond to antibiotic therapy, even though the in-vitro tests show that the organism is antibiotic-sensitive.

Jawetz in an important review on the problems of antimicrobial therapy states that "the microbial world has responded to the introduction of anti-microbial substances into its ecological balance with derangement of normal bacterial flora, development of resistance and disturbances in host-parasite relationship".

If antibiotic therapy had been kept within the range of its optimum effectiveness, problems would no doubt have still arisen in relation to antibiotic-resistant strains of organisms. However, it seems certain that the problems have been aggravated by the widespread and indiscriminate use of antibiotics; so often antibiotics are given either without adequate bacteriological control or to patients who do not need them.

The choice of antibiotic to be used in therapy should be made at all times in relation to the nature of the infecting organism and its antibiotic-sensitivity pattern. In the light of our present knowledge it would seem necessary to classify bacterial disease in relation to antibiotic therapy into two groups: those in which the infecting organism does not develop antibiotic-resistant strains, and those in which the organism either is resistant initially or develops resistance during therapy.

The organisms which do not as a rule develop antibiotic-resistant strains, and for which penicillin is still the antibiotic of choice, are *Streptococcus hæmolyticus* Group A, *Streptococcus pneumoniæ*, anaerobic streptococci, *Neisseria gonorrhœæ* and *Neisseria meningitidis*, *Bacillus anthracis*, *Clostridium welchii*, *Clostridium tetani*, *Treponema pallidum* and *Actinomyces*.

The organisms which do not as a rule produce antibiotic-resistant strains and for which one of the broad-spectrum antibiotics may be used are *Hæmophilus pertussis*, *Hæmophilus influenzæ*, the brucellæ, the salmonellæ, *Streptococcus fæcalis* and *Bacillus friedländeri*.

Antibiotic resistance is a problem in regard to the following organisms: the staphylococci, *Mycobacterium tuberculosis*, *Bacterium coli*, *Proteus vulgaris* and *Pseudomonas pyocyanea*.

Staphylococcus aureus presents the greatest problem in relation to antibiotic-resistant strains. The organism is widespread and causes many types of infection, ranging from skin infections to generalized systemic infection. There is abundant evidence that *Staphylococcus aureus* can and does readily develop resistance to penicillin and to the other antibiotics. There are many reported cases in which this organism is resistant to all antibiotics.

The figures quoted elsewhere in this issue by Dr. Phyllis Rountree illustrate well the problem of antibiotic resistance of *Staphylococcus aureus*. From a study of these figures it would seem that, apart from furunculosis, when an adult patient has acquired a staphylococcal infection by cross-infection in hospital, there is a 75% chance of the organism's being penicillin-resistant, a 27% chance of its being streptomycin-resistant and a 6% chance of its being resistant to all antibiotics. If the patient has a staphylococcal infection and is being treated in a casualty department of a hospital, there is a 50% chance of the organism's being penicillin-resistant. If the patient with staphylococcal infection is seen in private practice and has had no contact with hospital, there is a 75% chance that the organism will be penicillin-sensitive. In all patients suffering from boils either in private practice or in hospital there is a 60% to 65% chance that the staphylococcus will be penicillin-resistant. It is true that the problem of antibiotic-resistant strains of *Staphylococcus aureus* is greatest in hospitals, but it is alarming to note that 25·7% of nasal carriers of *Staphylococcus aureus* in the general population were carrying penicillin-resistant strains. This is twice the number found twenty months ago. It is not impossible that the problem of antibiotic-resistant staphylococci may become a problem of the non-hospitalized patient as well as the hospitalized.

It is evident, therefore, that the selection of the correct antibiotic to treat the patient with severe staphylococcal infection is very difficult. It is essential that sensitivity tests be carried out as soon as possible, and that they be repeated during therapy, if the organism can still be grown in culture. What is to be the choice of antibiotic while the result of the sensitivity tests is being awaited? It is certain that penicillin should not be the first choice if the patient has been cross-infected in hospital, or is suffering from boils. It is doubtful whether penicillin should be the first choice in private practice because of the 25% chance of the organism's being penicillin-resistant. It would probably be wise to use a broad-spectrum antibiotic for forty-eight hours until the results of the sensitivity tests are known. In areas where sensitivity tests are quite unavailable, it would seem that in severe staphylococcal infections broad-spectrum antibiotics should be used. For mild infections it may be permissible to try penicillin in the first instance and to change if there is no clinical response in thirty-six hours. There is abundant evidence to indicate that the staphylococcus develops resistance to chloramphenicol more slowly, and except in severe staphylococcal infections in the newborn, this antibiotic should be held in reserve. It is timely to point out that chloramphenicol-resistant strains of *Staphylococcus aureus* are increasing in number.

Erythromycin is effective against *Staphylococcus aureus*. There is ample evidence, however, that resistance to this organism can develop in as short a time as thirty-six hours. In my experience resistant strains developed in six of twenty-one patients treated with erythromycin.

When erythromycin was first made available, I made a plea for its restricted use. In view of this it is interesting to recall that in New Zealand recently the use of erythromycin has been restricted, because of a number of deaths which have occurred due to resistant strains. It is also interesting to quote from "Medical Progress", 1955:

> Bacteria rather rapidly acquire resistance to erythromycin and these may cause resistant infections in other individuals. For this reason penicillin should be preferred when equally good. It is considered that erythromycin should be reserved for staphylococcal infections which have been proved by laboratory tests to be insensitive to all other antibiotics (and surely this should include the sulphonamides). Because of the serious danger of building up a staphylococcal population resistant to erythromycin it should not be used in the treatment of most chronic infections, of trivial infections and of infections in which the bacterial cause is not known, nor as a cream for infections of the skin.

There is little doubt that this increased resistance of staphylococci to antibiotics is a result of antibiotic therapy. In population groups in which antibiotics are used to a limited extent or not at all, there are relatively few resistant strains. In a controlled study Lepper and his co-workers have shown that the proportion of strains resistant to erythromycin in a hospital population increased from 0% to 70% when the antibiotic was used for a five-month period. It fell to 33% when penicillin was substituted. After the substitution the proportion of penicillin-resistant strains increased from 35% to 83%.

The problem of antibiotic-resistant strains of *Mycobacterium tuberculosis* has been simplified by the use of isonicotinic acid hydrazide and para-aminosalicylic acid concurrently with streptomycin. However, strains resistant to all three are now occurring.

The problem of resistant strains of *Bacterium coli, Proteus vulgaris* and *Pseudomonas pyocyanea* is almost without solution. The number of strains of these organisms becoming resistant to all antibiotics is increasing throughout the world, and new antibiotics to deal with these organisms have not yet been found. Polymyxin can be used for *Pseudomonas pyocyanea*, but only with rigid check on kidney function.

In summary, the present position would seem to be that antibiotics are still very valuable therapeutic agents, but that they must be used with discretion and wherever possible under bacteriological control.

Antibiotic-resistant strains of organisms are becoming more common each year; and unless the greatest caution is observed, we may find that antibiotics are no longer of use in the treatment of staphylococcal infections and infections due to the *Bacterium coli, Proteus vulgaris* and *Pseudomonas pyocyanea*.

In hospitals, where the incidence of resistant strains is greatest because of cross-infection, the answer is not in the finding of new and better antibiotics, but in a return to the principles of careful surgery, asepsis, proper control of wound dressings and the restricted use of antibiotics. In one American hospital the staff have been courageous enough to introduce in the treatment of burns the use of only one antibiotic at any one time. During a three-year period patients were treated, locally and systemically, on alternating programmes of chlortetracycline and chloramphenicol. The resistant strains of *Staphylococcus aureus* which developed to the particular antibiotic during its use were reduced in number when administration of the antibiotic was stopped and the other substituted. It would be a very valuable experiment if in one Australian hospital antibiotic therapy was suspended except as a life-saving measure for a period of six to twelve months and the effect on the incidence of resistant strains determined. To do this would take courage and would draw criticism, but the results would be invaluable.

In conclusion it is desired to draw the attention of all medical practitioners to the National Health and Medical Research Council Special Report Series No. 6, 1955, "Chemotherapy with Antibiotics and Allied Drugs", and to the work sheet which from time to time is published in THE MEDICAL JOURNAL OF AUSTRALIA. These publications are a very useful guide to antibiotic therapy.

EDGAR THOMSON,
Sydney.

British Medical Association News.

SCIENTIFIC.

A MEETING of the New South Wales Branch of the British Medical Association was held on December 8, 1955, at the Robert H. Todd Assembly Hall, British Medical Association House, 135 Macquarie Street, Sydney, DR. H. HASTINGS WILLIS, the President, in the chair.

Toxic Confusional States.

DR. D. C. MADDISON read a paper entitled "Toxic Confusional States" (see page 393).

DR. H. N. MERRINGTON read a paper entitled "Toxic Confusional States" (see page 397).

DR. JAMES ISBISTER, in opening the discussion, said that he proposed to speak from the point of view of one who encountered many confusional states, not in mental institutions, not in general practice, but in general medical wards of hospitals. From that point of view his experience was probably different from that of the other two speakers, and he always felt sorry for the general practitioner who was called to examine an acutely confused patient, and who had very little to guide him in the likely diagnosis. Many such patients were sent to hospital with the diagnosis of "uræmia"; he (Dr. Isbister) would have something to say later about the question of that over-all term. He thought that if a person became acutely confused, one of three things was likely to happen to him. If it happened in the street, as Dr. Maddison had pointed out, he was likely to be put in the police cells. If it happened in his home, he might be admitted to hospital with the diagnosis of "uræmia". If it happened at home or in hospital, often he

was sent to the Reception House as a psychiatric patient. Dr. Isbister said that he well remembered the first Form 2A which he completed, admitting a patient to the Reception House. She died twenty-four hours later of hepatic failure. The patient was a known alcoholic, and had been under his observation with peripheral neuritis and other alcoholic manifestations. When she was admitted to hospital on this occasion, she had all the evidence of an acute alcoholic state. She died in the Reception House of cirrhosis of the liver. Dr. Isbister said that he sympathized with those who had to cope with such people at the Reception House. Ever since that episode, he had urged resident medical officers not to send a patient to the Reception House unless it could not be avoided, because if such a patient happened to have something physically wrong, it was the worst place for him to be. The Reception House had to deal with a great many patients in a short time, and Dr. Isbister asked Dr. Radeski to speak about the differential diagnosis of all the confusional states that he had to deal with in a short time. With regard to patients admitted to public hospitals, Dr. Isbister said that many of them had the label "uræmia"; that word should not be used merely to label a person who was confused. When a surgeon operated on a patient, who became confused because he was over-hydrated, or because he was oliguric and could not eliminate the sedatives he had been given or for some similar reason, the usual label was "uræmia". If a person for some inexplicable reason became confused and disorientated and perhaps had some neurological signs, the diagnosis was again "uræmia". Having put such a label on a patient, one felt quite satisfied in doing nothing, because one felt that nothing could be done for him. The word "uræmia" should not be used, but a more precise diagnosis should be aimed at. Dr. Isbister went on to say that in his experience alcohol was by far the commonest cause of toxic confusional states in public hospitals. The conditions fell into two main categories. The ordinary *delirium tremens*, which occurred within two or three days of the withdrawal of alcohol owing to some acute illness like pneumonia, was familiar to all. The patient causing most difficulty in diagnosis was the person who had had a large alcoholic intake with very little food for a period of two or three weeks, and who presented a condition often referred to as Wernicke's encephalopathy, in which not only confusion but neurological signs were present, possibly including hemiplegia or ocular pareses. In such cases diagnosis was often difficult, and the patient did not have a period of one or two days of lucidity before the *delirium tremens* came on. Dr. Isbister asked Dr. Maddison on what general principles one made a diagnosis between toxic confusional states and the organic psychoses, such as those caused by intracranial tumours and cerebral vascular accidents. It was often difficult to differentiate between them, and history, the physical examination and investigations might not provide a ready answer. Dr. Isbister agreed with Dr. Merrington in his statement that all too frequently the results of their therapeutic efforts gave rise to toxic confusional states. Dr. Merrington had mentioned belladonna, but he had not mentioned the use of one of the belladonna alkaloids in the eyes, which was a common cause of confusional states. Dr. Isbister had seen children and adults, perhaps on one application of drops in the eyes, or perhaps after their application for a few days, present a toxic confusional state whose cause had been overlooked. Referring to reserpine, Dr. Isbister said that he well remembered, soon after it had come into use, a patient saying that she was quite sure that her rather confused and depressed state was due to the tablets she was being given. Having examined her before their administration was begun, and knowing that she was somewhat depressed then, he told her that he was quite certain that it was not the tablets, and referred her to a psychiatrist. The psychiatrist pointed out that the condition was due to reserpine. Dr. Isbister said that had brought home to him again that whenever one encountered those states, one should ask what therapeutic agent might cause that state. Dr. Isbister agreed with Dr. Merrington that it would be very useful if the bottles containing prescribed pills and medicines were labelled with the name of the substances contained in them. Often when a patient came to hospital with a number of bottles of medicine prescribed by different doctors, it was impossible to determine what they all were.

DR. C. RADESKI said that at the Reception House there were on an average about 90 admissions per week, and as there was only one medical officer it was not very easy to ascertain the causes of toxic confusional states. He estimated roughly that about 30 of the patients would be senile people, about 25 to 30 would have straight-out psychiatric disorders, and the rest would be alcoholics. Alcoholism was by far the commonest condition seen at the Reception House. It was often misdiagnosed by the general practitioner; but that was not his fault, because the person who was alcoholic and confused often could give no account of himself, and the relatives frequently did not realize that he had been drinking. Dr. Merrington had mentioned paraldehyde. Dr. Radeski thought that it was good; but if it was used it should be used properly—10 cubic centimetres should be given intramuscularly, and fairly deeply, if it was to be effective. Dr. Radeski said that he was interested to hear that Dr. Isbister told resident medical officers not to send patients to the Reception House unnecessarily; he wished the same advice could be given in all hospitals. A great many patients were unnecessarily sent to the Reception House from hospitals, with great distress to the relatives and to the patient when he recovered. The obvious thing to do was to have a place in general hospitals where such patients could be looked after. Admission to the Reception House implied a legal restraint; the patient automatically had to see a magistrate. Dr. Isbister had asked for points in making the diagnosis of a toxic confusional state, and how the different types could be distinguished. Dr. Radeski said that he did not know. During the last few months all kinds of conditions had been seen at the Reception House, the patients often having been sent in by general practitioners. He appreciated the difficulty confronting a doctor called to examine a patient, often for the first time, in a house in the suburbs with poor light, no adequate history, and a bottle or bottles of tablets near by. The doctor was quite unable to assess such a patient. There had recently been three patients with meningitis, all afebrile, a patient with bacterial endocarditis, and a boy of nineteen years with a pulmonary embolism. Dr. Radeski did not know that there was any way by which the general practitioner particularly could be expected to assess such people. It was relatively easy in a hospital. There were no distinctive features, other than perhaps a flatness of affect, which was a vague term. But that did not always apply, and sometimes the toxic confusional states were quite indistinguishable from one another and from psychotic excitement states until the patients settled down.

DR. O. SCHMALZBACH spoke in defence of bromides; he said that they still had a place in psychiatry, particularly in a special type of epileptic seizure. Dr. Schmalzbach recalled the case of a patient whom he had recently seen, and who was suffering from epilepsy in a special psychomotor form. Dr. Schmalzbach intended to publish the case in full in the near future. All kinds of investigations were carried out with negative results. The patient had what he described as "attacks of cough"; it was a sort of sneezing with an admixture of coughing and inarticulate noise that was so loud that at times it disturbed the other patients in the hospital. He went to the Mayo Clinic, where he was thoroughly investigated all over again, even bronchoscopically. Dr. Schmalzbach said that he had received a letter from the Mayo Clinic, stating that the results of the examinations were essentially negative throughout, and the patient was considered to be suffering from anxiety hysteria. Although Dr. Schmalzbach knew that the patient had a number of psychological problems in his marital life and in his business, he did not accept the diagnosis of anxiety hysteria. He considered the patient as suffering from temporal lobe epilepsy of a special type. Dr. Schmalzbach instituted treatment with "Mysoline" and potassium bromide. To his amazement, after four weeks' treatment the patient completely lost his attacks. He relapsed for a short period, but never had the same number of fits as before, and after further treatment he had remained free from attacks now for the last three months. Dr. Schmalzbach did not know whether it was because of or in spite of the bromide; but he thought that if bromides were cautiously used in small dosage and not for too long, they had some place in the treatment of epilepsies.

Dr. Conolly, from the chair, said that after thirty years' experience in general practice, he thought that the patients with confusional states could be divided into two categories—the very young and the very old. The problem of alcoholism was well known to those in general practice. He had never been near enough to the Reception House to be able to unload such patients. It had been stressed that there were very many causes; it was hard to assess them at times, especially in a country practice by the light of a kerosene lamp or candle. However, that was where one really learned medicine.

DR. CHRISTINE MACMAHON said that she had been interested to hear Dr. Maddison say that he had not seen many toxic confusional states in puerperal cases. Possibly newer methods of therapy had altered the pictures one saw. When she was first at Broughton Hall, a great number of such cases were encountered. During her term in the admission ward there, quite a number of patients with post-operative

and puerperal confusion were admitted—people who had had an infection going on for some considerable time. In puerperal cases, the patients might have had a uterine infection or a series of breast abscesses which had continued for weeks or even months. The patient was extremely debilitated physically, and then drifted into a confusional state. Dr. MacMahon said that she had also seen confusional states follow operation for a number of gynæcological conditions, in which there had been an infection going on for some weeks. She thought that the picture had changed probably because those infections no longer lasted for weeks; they were cut short with antibiotics. Dr. MacMahon said that she had had experience of many such confusional states, which cleared up well; the patients went home in excellent condition physically and mentally. But they were very trying cases, because of the patients' extreme physical debility, and because their mental state had in many cases gone on for some weeks before they entered Broughton Hall for treatment, and sometimes it persisted for months before the actual infection had been cleared up.

DR. RALPH READER said that he had one thing to add to the discussion; both speakers had mentioned it, but had not stressed it. It was that many toxic confusional states might be associated with, or at least precipitated by, dehydration, electrolyte disturbance or acid-base disturbance. The patient he had in mind had gone through the Reception House, and was in fact suffering from uncomplicated pyloric stenosis. The condition was diagnosed as psychiatric. The patient became completely normal when her fluid balance, her alkalosis and her potassium defect were corrected. Dr. Reader said that that was the basis of many mental disturbances associated with uræmia, whether the uræmia was due to primary renal disease or not. Dr. Reader thought that even when the term was used in its conventional and correct sense, one could do something for uræmics even in chronic renal disease. One could certainly improve their mental state by attention to that aspect of their condition.

Dr. Maddison, in reply to Dr. Isbister, said that there was no easy answer to the question of diagnosis. He believed that in the majority of cases one could arrive at a fairly satisfactory diagnosis in separating cases of toxic confusion from cases of confusion due to cerebral disease. He had considerable experience of the problem, and dealt with it chiefly by the history, examination and investigation. One procedure that he thought was of some value was the intravenous injection of small doses of "Sodium Amytal", which might have a peculiar effect in certain cases of organic brain disease. Dr. Maddison said that it was well recognized as a useful diagnostic procedure to differentiate the organic from the functional psychiatric syndromes. Small doses of "Sodium Amytal" given intravenously would not confuse the normal person, but almost certainly would lead to obvious confusion in the person with organic brain disease. If gross confusion was obvious anyway, then, of course, the procedure was not applicable. Dr. Maddison agreed that there was no easy answer, and one got surprises at times. He remembered two or three years previously a young man who presented the typical picture of what seemed to be an acute confusional state. Lumbar puncture was performed, and blood was found in the cerebro-spinal fluid; he undoubtedly had a subarachnoid hæmorrhage, of which the dominant feature at that time was acute mental confusion. Dr. Maddison said that he had not meant to imply that he was unaware of the problems of alcoholic confusional states; but he thought that in general they were very well covered elsewhere. In reply to Dr. Schmalzbach, Dr. Maddison said that the case he had described was interesting, but it did not prove the value of bromide. As he had remarked elsewhere, the Professor of Pharmacology at the University of Sydney had stated that bromide had one use only in medicine, one place in which it was completely valuable—in medical photography. Otherwise its use should be banned. In reply to Dr. MacMahon, Dr. Maddison said that the period of her experience and of his had not coincided in regard to puerperal psychosis. Undoubtedly the conditions had changed. He had no doubt that the picture she had described was seen not very long previously, but was quite rare at the present day. He had encountered only one such case in the last twelve months; the patient became irrational and confused twenty-four hours *post partum*, but her basic personality was such that he could not be sure that the condition was a true puerperal psychosis. Dr. Maddison said that he agreed with what Dr. Reader had said about electrolyte and water disturbance; he had had experience of one or two relevant cases. The question arose of the use of ACTH and cortisone. Dr. Maddison said that in his experience they did not produce actually a confusional psychosis, but rather the schizophrenic or manic type, and therefore they were rather outside the scope of his paper. The water and electrolyte disturbances seen in all fields of medical practice were very important and could usually be prevented if the mind was alert.

Out of the Past.

In this column will be published from time to time extracts, taken from medical journals, newspapers, official and historical records, diaries and so on, dealing with events connected with the early medical history of Australia.

NATIVE THERAPY.[1]

[From "An Historical Journal of the Transactions at Port Jackson and Norfolk Island", by John Hunter, Esq., Post Captain in His Majesty's Navy, London, 1793.]

October, 1790.

IT has already been observed that the natives have some idea of a future state and that they believe in spirits; the following circumstance leaves no doubt that they likewise believe in charms—Bannelong's wife one day complaining of pain in the belly, went to the fire and sat down with her husband, who, notwithstanding his beating her occasionally, seemed to express great sorrow on seeing her ill, and after blowing on his hand, he warmed it and applied it to the part affected: beginning at the same time a song which was probably calculated for the occasion: a piece of flannel being warmed and applied by a bye-stander, rendered the warming of his hand unnecessary, but he continued his song, always keeping his mouth near to the part affected, and frequently stopping to blow on it, making a noise after blowing, in immitation of a barking dog: but though he blew several times he only made that noise once at every pause, and then continued his song, the woman always making short responses when he ceased to blow and bark. How long this ceremony would have continued is uncertain, for Governor Phillip sent for the doctor and she was persuaded to take a little tincture of rhubarb, which gave her relief and so put an end to the business.

Correspondence.

THE BAN ON HEROIN.

SIR: A few facts have emerged from the recent correspondence on the banning of heroin: (i) Patients do receive relief from the use of heroin. (ii) Medical practitioners who have used it find it useful and difficult to find substitutes; they wish the ban to be lifted or modified. (iii) Pharmacologists claim knowledge of the effects of heroin and warn against the power of addiction, yet they do not treat patients and their knowledge is acquired from books or animal experiments. (iv) Administrators are anxious to facilitate their administration, especially if they feel they are on the side of a majority and not a minority opinion.

Are the individuals who benefit from heroin only a few, or the doctors wishing to lift or modify the ban on heroin only small in number, or mild in protest? The number who are sick and dying each day amongst us and would be relieved by heroin must far outnumber those who would develop a possible addiction likely to worry the patient, his family or the administration of the country. The November 19, 1955, issue of the *British Medical Journal* claims eleven large teaching hospitals in England have asked for the ban to be lifted and several hospitals in England have laid by stores of heroin to last seven years.

There are two groups of people who use heroin: (i) those who derive pleasure from it; (ii) patients under medical treatment. In medical treatment it is dispensed in two ways: (*a*) hypodermically for relief of major discomforts; (*b*) in mixtures for minor ailments such as coughs *et cetera*. If my information is correct, it is this latter use of proprietary medicines in small doses which has been the reason why in countries like Australia the consumption of heroin is high.

[1] From the original in the Mitchell Library, Sydney.

There seem to be only two groups of people who have a full and intimate appreciation of the effects of drugs—the patient and the medical practitioner and nurses observing the effects on their patients. A fundamental principle is involved: the right of a reputable medical practitioner to treat his patient as he and his patient seem fit and not as some lay administration might dictate. By lay persons, I include all those not actually engaged in the treatment of patients.

I consider the problem is twofold: (i) the prevention of addiction; (ii) the medical treatment of patients. A person who is prone to become an addict will become an addict whether heroin is banned or not. Such an individual is not at all fussy about the drugs he uses to satisfy his addiction, unless the fact that it is in short supply will add to its fascination—to wit, our experiences of rationing during the war and immediately after. The question of a drug being more susceptible to addiction than another is debatable. The immediate concern of the medical practitioner treating his patient is, after all, the factor which drug or drugs is going to suit his patient's needs. Surely the medical treatment of patients is not to be subjugated to the apprehension of the criminal uses of the drug.

As a result of clinical observations made recently with so-called heroin substitutes I find that some of them as stated by the manufacturers are easily five times more effective than morphine; that the dosage prescribed is far too high for safety, that they are cumulative in action, are definitely pain killers and soporifics, but do not produce the feeling of exhilaration and well-being which accompanies the administration of heroin. Further, heroin does not appear to be cumulative, has a definite period whilst acting, say four to six hours if injected with atropine; and this is further indicated by an increase in flow of a thin nasal discharge at the end of this period, which could be attributed to the loss of action on the part of the atropine, which I consider should be an essential part of the administration and treatment with heroin—in fact, a sort of control.

Also, although heroin can no longer be procured or used in New South Wales, my previous clinical tests convinced me at any rate that heroin was by far the safest drug to use—under medical supervision—always acted in a definite way in affording relief and was easy to "walk away from". In fact it was not addictable unless the person wished to make it so. So I am still "all the way" with heroin as the most useful and reliable pain reliever in the Pharmacopœia; also the safest if handled with discretion.

You will probably have gathered that I am merely a clinical observer. I know nothing about animal experiments, and what I read in most books does not represent the true facts. But as one of my old "horsy" friends remarked during an argument: "I don't know much, but what I do know I ——— well know in a loud voice." But, here's hoping we can do our best for the poor old patient.

Yours, etc.,

Macquarie Street, W. ALEXANDER DUNN.
Sydney,
February 10, 1956.

THE MIND AND THE BRAIN.

SIR: In the journal there have appeared lately a few letters on the mind, and, of course, reviews on books about psychiatry. The impression given is one of confusion. Professor Eccles's book "Neurophysiological Basis of Mind" is a fair example of the basis of this confusion. After seven chapters on physiology—that is, on the physical aspects of nerve impulses, synapses, the structure of the brain cells—there suddenly appears the question in Chapter VIII: How does this material apparatus get in touch with mind, or, as Eccles frankly puts it, "with the ghost"? And this immaterial mind or ghost has, according to Eccles, space, time relations—that is, it is of the world and yet not of it. The evidence for its existence is (*a*) effect of thought on moving dice—that is, a new version of table raising—and (*b*) telepathy or psychokinesis [*sic*].

Thought is a product of the brain. Surely the evidence for that is conclusive. That we do not yet know the actual physico-chemical changes that occur during thinking means no more than investigation must proceed, and clues are not lacking. The nerve cells of the forebrain, the main or possibly the sole organ of thought, are highly developed and a late product of evolution. It is certain that they are subject to exhaustion and also liable to disturbance by toxins. It is also possible that they need certain unknown chemical substances for their proper functioning.

The brain serves not only to integrate the body, but also to integrate the individual in society. Strains, stresses, frustrations, anxieties, fears, bear heavily on the brain cells. It is not unnatural to expect protective reactions on their part, for example, catatonia. Physiology, biochemistry, pathology, political economy have therefore indeed a tremendous task to perform before we can really understand, prevent and properly treat the neuroses and the psychoses. I submit that ghosts, table raising, telepathy, supranormal cognition and the equally unscientific Freudian and other psychoanalyses constitute a read obstruction to scientific investigation. They should be consigned to their proper region, the region of charlatanry, superstition and witch-doctoring.

Yours, etc.,

473 Bourke Street, G. P. O'DAY.
Melbourne,
February 15, 1956.

A NEW METHOD OF MEDICATION.

SIR: I am writing to submit to your readers for their approval a method of medication so far not generally known. The recent trend in therapeusis, to use the sublingual method of introducing drugs into the systemic circulation, with a view to quick action, has many advantages, but it has disadvantages. The drugs used are mostly prescribed for the relief of circulatory distress. Patients suffering from this disorder use the open mouth as a means of letting more air in than they can obtain by nasal respiration. For this reason, recently, I have advised patients to crush the tablet into a powder and place it on the cranial surface of their denture, should they possess one. Physicians who care to try this method will find it very efficient, and as quick as the sublingual method. It is very useful in people who use the nitrites or asthmatics who require the sympathomimetic kind of drugs. Drugs such as methyl testosterone can be crushed into a powder and placed on the denture before going to sleep at night time. Phenobarbital and drugs of this variety are absorbed very quickly, and the therapeutic result is more successful than by the usual method.

Yours, etc.,

45 Spring Street, GERALD DOYLE.
Melbourne,
February 14, 1956.

THE BRITISH MEDICAL ASSOCIATION AND ITS MEMBERS.

SIR: I wonder why Dr. A. M. McIntosh (M. J. AUSTRALIA, February 18, 1956) finds it necessary to present such a panegyric of praise to the permanent staff of the Association. The general courtesy, attention and devoted service of Dr. J. G. Hunter and Dr. H. Hunter and Miss Cameron surely do not need this . . . or do they? I admit that on several occasions, both in general meetings and annual meetings of delegates, I have crossed swords with Dr. J. G. Hunter and Dr. H. Hunter, but I have always remembered that they have acted as spokesmen either for the Federal or New South Wales Branch Councils, and without doubt these councils have shown their shrewdness in requesting these secretaries to act accordingly in that they were probably more capable of presenting their Council's viewpoints clearly, succinctly and logically; and, of course, possibly, if the meetings were somewhat hostile, they would carry a proportion of the blame.

Some answer from a general practitioner and an honorary secretary of a local association for many years is required to the complaint of apathy of the profession made by Dr. Munro Alexander (M. J. AUSTRALIA, January 7, 1956). This apathy, which I would prefer to term frustration and disgust, in my opinion, arises from the lack of activity shown by Council in regard to local association requests.

Twenty-five years ago local association meetings were well attended and general practitioners took a keen interest in medico-political and economic matters intimately affecting general practitioners. Today, probably in most local associations, it is difficult to obtain a quorum for the regular quarterly meetings. One important change in the profession has been a distinct change in its character over the last thirty years; consultants are becoming much more numerous,

and thus their interests differ greatly from those of a practitioner. Further, most members today find it necessary to put in longer hours in order to obtain sufficient remuneration to meet their increasing expenses. The purchasing value of the pound is four times less than it was in 1939. These hours mean that fewer men are able to attend their local association meetings.

But much more important than the above in causing apathy in local associations is what one may term the procrastination of the Council in dealing [*sic*!] with matters unanimously carried by the annual meeting of delegates. For example, after five years we are still paid on a per-capita system for repatriation widows; the invariable delay (eighteen months to two years) in obtaining an increase from the licensed insurers for workers' compensation fees; and I believe the increase of fees desired by government medical officers in the country is still a hardy annual at the annual meeting of delegates. It took the Council three years to rid the profession of the lodge system, even though on several occasions this was unanimously requested by the annual meeting of delegates and subsequently a convention of delegates. Finally a plebiscite stirred them to action.

The Council has offered an excuse for these delays in that they desire to be absolutely sure of the wishes of members; consequently it is quite obvious that they either did not trust the instructed opinions of delegates and/or that they themselves were quite out of touch with the wishes of the general body of practitioners.

It has been my experience over the last eight or ten years that gradually those members who once regularly attended the local association meetings are losing their interest in Association problems and cease to attend meetings. Their repeated requests to the Branch Council are either shelved or ignored. They have not forgotten what many members term "the sell out" of the profession to the Federal Government in regard to the Pensioners' Medical Service.

And now I come to reply to Dr. Naomi Wing (M. J. AUSTRALIA, February 18, 1956). Some six years ago the annual meeting of delegates unanimously recommended to Council a new method for election of Council. This included six representatives from the metropolitan and six from country local associations, and either one or two from the women members and government medical officers. This matter was referred to a convention, at which certain senior members of the Council vigorously opposed the idea and the chairman obviously did not favour it. The meeting, which included representatives from special groups, carried a resolution in favour of the change. The Council, in spite of this, decided to hold a plebiscite; certain members of Council, prior to the plebiscite, addressed local associations, where they recommended the Council's amendment of the idea, namely, the present method of election. The brochure accompanying the plebiscite paper was prepared by Council and pretended to present both views.

It is interesting to note that in the present method of election to Council, if there is an election for special group representatives, this is voted for by the whole profession. Finally, I contend that in the present division in practice interests of the profession the only manner in which this agreed apathy can be cured is by true representational election in which every section (local associations, special groups, government medical officers and women) appoint their own members to Council.

I suggest the Council wake up from its somnolence to its true responsibilities.

Yours, etc.,

C. H. JAEDE.

4 Robey Street,
Mascot,
New South Wales.
February 22, 1956.

SIR: In recent months there has, I think, been some evidence of the need for the medical profession to increase its self-assertion and self-defence, as so admirably pointed out by Dr. Munro Alexander.

Firstly, heroin is made the subject of a ban, although there is, I venture to state, very little if any evidence of addiction through medical prescribing. Yet the entire medical profession of Australia is forbidden to use it, as though they were the culprits. Heroin is a drug which I never prescribe (perhaps I should), but my view is that not even one key should be taken out of the medical piano—it should be there to use if considered necessary.

Again, the increased use of pethidine is referred to in an article in the daily Press in a way which I thought created the impression that Australian doctors were lax in their use of this drug. This could in fact be so in a few cases, but it would take a lot of very careful investigation to be sure that greater distances from remedial treatment, an increasing proportion of elderly patients, the increasing road toll and an acute shortage of hospital accommodation were not at least partly, if not entirely, to blame.

Finally, the observed increase in the number of pension visits might well be due largely to a number of factors outside the control of the profession, such as increasing difficulty in obtaining hospital accommodation, an increasing awareness of the public of the benefits of the scheme, and an increasing number of pensioners.

New South Wales, with its more numerous largish cities, would be expected to show higher figures than her sister States, since where medical facilities are handy it is natural (and reasonable) that they should be used more.

Abusers of the scheme should, of course, be severely dealt with, as they can bring nothing but discredit to the profession, but quite legitimate factors could be producing the trend observed in the figures.

To sum up, sir, let us not lose the quality of self-criticism, but neither let us be too ready to see fault where it does not exist, nor to accept blame where there is none.

Yours, etc.,

JOHN F. LAYCOCK.

3 Johnston Street,
Annandale,
New South Wales.
February 12, 1956.

A REVIEW OF 268 CASES OF GASTRECTOMY FOR PEPTIC ULCER.

SIR: In my "A Review of 268 Cases of Gastrectomy for Peptic Ulcer" in the journal of February 25, 1956, there appears a footnote which indicates that the series had increased "to 280 with no further mortality".

I would like to add, that of the extra twelve cases, two were in acute hæmorrhage, and one in acute perforation, and nine were interval cases.

The series of consecutive interval cases without mortality thus numbers 170.

Yours, etc.,

V. J. KINSELLA.

235 Macquarie Street,
Sydney,
February 25, 1956.

Obituary.

ARTHUR VINCENT MEEHAN AND ANDREW RUSSELL MURRAY.

THE medical profession of Australia, and indeed the whole population of the Commonwealth, were profoundly moved when they received the news that Dr. Arthur Vincent Meehan and Dr. Andrew Russell Murray were shot in their consulting rooms by a former patient, who was mentally unbalanced and subsequently shot himself. At the same time, Dr. M. J. Gallagher was wounded, and Dr. J. R. S Lahz suffered severely from shock. Fortunately both Dr. Gallagher and Dr. Lahz have recovered. Arthur Meehan and Andrew Murray were held in the highest possible regard by members of the medical profession in Queensland and in other States, and general consternation was evident from the many messages of sympathy received. At a meeting of the Council of the Queensland Branch of the British Medical Association on December 23, 1955, Dr. Alan E. Lee, the President, said that since the previous Council meeting there had occurred in Brisbane an event unparalleled in peace time; it had resulted in the tragic deaths of two colleagues and the serious wounding of another. Dr. Lee said that they had been reminded forcibly that their calling exposed medical men to potential dangers, even if the threat was rarely fulfilled. A wave of horror had swept throughout Australia, and messages of condolence had been received by the Queensland Branch from many individuals and medical bodies. These included the President and General Secretary of the Federal Council; the Presidents or Acting Presidents of the Western Australian, South Australian and Victorian Branches; the Ballarat subdivision of the Victorian Branch;

the Northern District Medical Association of New South Wales; the Australasian Trained Nurses' Association; the National Bank of Australasia; the Institute of Chartered Accountants and many others. The loss to professional life in Queensland had been incalculable.

Dr. Lee said that Dr. Meehan was the doyen of orthopædic surgery in Queensland. Not only had he been the first Queensland doctor to make orthopædic surgery his life's work, but by his capacity and enthusiasm he had surrounded himself with a group of young apprentices to the art who were now exercising an influence in the State and would long perpetuate his methods and his practice. In many other ways he had exerted himself for the good of the profession. Dr. Lee referred particularly to Meehan's work up to the time of his death on the Post-Graduate Committee, of which he had been chairman for many years. He had been active in his association with the Royal Australasian College of Surgeons, of which he was a Foundation Fellow, and had served on the Queensland Executive Committee for some years, acting for a time as its chairman.

Dr. Lee went on to say that the death of Dr. Andrew Murray was even more poignant, since he was much younger and still had a family dependent upon him. He referred to Murray's professional career and to his work as casualty supervisor and later as visiting orthopædic surgeon at the Brisbane Hospital, where he had done much to enhance its reputation in the field of the surgery of injury.

Dr. Lee said that letters of condolence had been sent to their families, and the Council had been fully represented at both funerals. After standing in silent tribute to the memories of Arthur Vincent Meehan and Andrew Russell Murray, the Council adopted the following resolution:

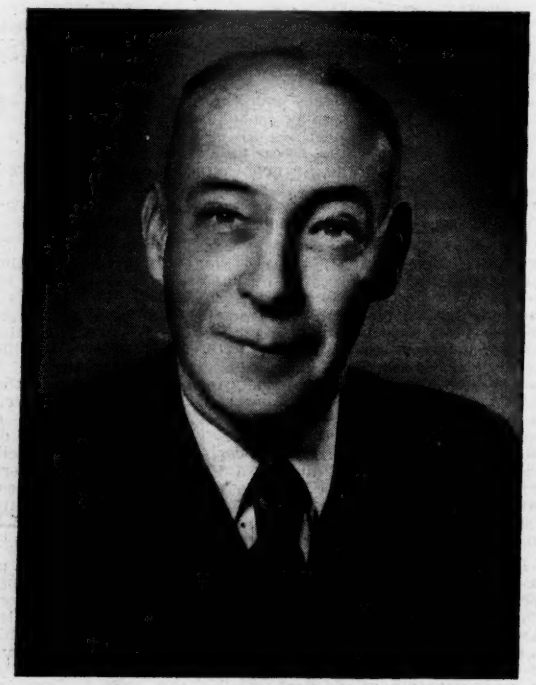
> The Council deplores the untimely deaths of Dr. A. V. Meehan and Dr. A. R. Murray, paying tribute to the great influence each has exerted in the practice of orthopædic surgery in Queensland, and in the general profession of medicine, and offering sympathy to their relatives in their tragic loss.

ARTHUR VINCENT MEEHAN.

Arthur Vincent Meehan was born in Sydney in 1890. His father was Joseph Meehan, and he had four brothers and two sisters. He was educated at Saint Mary's Cathedral School, and at the University of Sydney, where he had a distinguished record. He graduated as Bachelor of Medicine in 1914, and spent eighteen months at Sydney Hospital, where he held resident posts in several departments. In 1916 he enlisted in the Australian Imperial Force, and left Australia in June of that year with the Ninth Field Ambulance, which was commanded by Lieutenant-Colonel F. A. Maguire. In France early in 1917 he was promoted to the rank of major and transferred to the Eleventh Field Ambulance, and in this unit he spent the remainder of his active service. He saw service at the battle of Messines and in the third battle of Ypres, in which he was wounded at Passchendaele in October, 1917. His dressing station was hit by a shell while he was tending wounded, and he received shrapnel wounds in the back and in the foot. His foot was so severely damaged that it had to be amputated, and it is said that he supervised his own amputation. After convalescence in England, he was for a time sent to the staff of the Australian Auxiliary Hospital at Southall and later on spent several months at Liverpool, where he began his special work in orthopædics. He became a fellow of the Royal College of Surgeons of Edinburgh in 1918. He was returned to Australia early in 1919, and in June of that year was married to Marian Kenny, to whom he had been engaged before he left Australia. He was promoted to the rank of lieutenant-colonel and was transferred to Brisbane to take over the running of Rosemount Military Hospital. He left his mark on this institution, and improved its organization. He did a great deal for the "Diggers", particularly for the incapacitated. The post-war years were full of difficulties, and Meehan became the adviser and confidant of many of the returned men. He was made an honorary member of and consultant to the Limbless Soldiers' Association of Queensland. When he returned to Australia, Meehan was on crutches; he subsequently used an artificial leg, which gave him much trouble for several years. His leg had to be reamputated twice. The fact that he himself was an "amputee" must have led to understanding between him and many of his patients. It was clear to everyone that he overcame a severe disability with courage and fortitude, and in this way could not help being an inspiration and an example to many crippled ex-soldiers.

Meehan, as already stated, was the father of orthopædics in Brisbane. He commenced practice in Wickham Terrace in 1920. In the same year he was asked to start an orthopædic unit at the Brisbane Children's Hospital; he served this institution until 1931. He was on the staff of the Brisbane Hospital from 1922 to 1928. When the children's branch of the Mater Misericordiæ Hospital opened in 1931, Meehan became a member of the staff. He also served on the Mater Misericordiæ Public Hospital from 1938 until he resigned in 1950 at the age of sixty years and joined the honorary consultant staff. He acted as orthopædics consultant to the Army and to the Royal Australian Air Force during the second World War. Meehan took an active part in the activities of the Australian Orthopædic Association. He was a foundation member, and was a member of the Council for many years; he held the offices of vice-president and also president. No meeting of the Orthopædic Association seemed complete without him. He held definite ideas on what should be done in matters of treatment and his views always commanded respect.

Meehan's outstanding characteristics were his obvious sincerity and his honesty. He acted as adviser to the Editor of THE MEDICAL JOURNAL OF AUSTRALIA in orthopædics on more than one occasion. To be taken to his home and to be admitted into his happy family circle was an honour and



a worthwhile experience. He was a devout member of his church. His Requiem Mass was attended by some 1800 persons, including over 200 medical men, some of whom had come from other States. His death is a great loss to the world of medicine and to the specialty of orthopædic surgery. Widespread sympathy has been expressed to his wife, his two sons and his four daughters. He had the satisfaction of knowing just before his death that both his sons had qualified as medical practitioners. He had 17 grandchildren.

"P.A.E." writes: Forty years is a long period in the life of any man, but it has been my privilege to have known the late Arthur V. Meehan for that time, and it is a great pleasure to recall and think about incidents that occurred during this friendship. I feel honoured to be asked to write something of what I know of his odyssey.

Although I had known Arthur Meehan as a student, it was not until he was appointed as a resident medical officer at Sydney Hospital that I came to know him well. He was an exemplary house surgeon. He also took a fatherly interest in the students allotted to the patients under his care, and he gave them every help. I was one of the fortunate students.

Later he was the surgical registrar when I was a house surgeon. He was an efficient registrar, and he saw that the

house surgeons did their work to his satisfaction. He expected the best and got it.

It was not until my return to Australia in 1923 that I saw Arthur Meehan again. He was established in private practice as an orthopædic surgeon. He was the first and, in those days, the only orthopædic surgeon in Brisbane. He was also the visiting orthopædic surgeon to the Brisbane General and Children's Hospitals.

At this time I had much to do with Arthur Meehan. Plumbism was prevalent amongst Queensland children. After working in children's hospitals overseas, I was astonished to see among my medical out-patients at the Brisbane Children's Hospital so many children in irons owing to lead palsy. Thus it came about that I was brought very much in contact with him, both at the Public Hospital and in my private practice.

Later, when the Mater Misericordiæ Children's Hospital opened in July, 1931, Dr. Meehan was the honorary orthopædic surgeon and I a senior physician. We both held these appointments until his retirement in 1952.

Arthur Meehan was an orthopædist of outstanding ability, who, I imagine, would have taken his place in any gathering of orthopædists anywhere in the world. He was methodical in the investigation of his patients, which included a careful history and a thorough examination. He considered carefully the collected evidence before making a final decision. In many cases his diagnosis would not be made until after a search through his library, which was a good one, and after a careful review. His patients were his first consideration.

In addition to the practice of medicine, Arthur Meehan gave much time to the work of medical societies, such as the University of Queensland Post-Graduate Committee, of which he was chairman for many years, and the Mater Misericordiæ Hospitals' Clinical Society. He took an active part in lectures and demonstrations to post-graduates and students. In these he excelled.

He was one of the foundation members of Ballow Chambers, Limited, and was a member of the board of directors from the formation of the company to the time of his death. His advice was always sound and conservative, and his was a steadying influence in the conduct of its affairs.

Arthur Meehan was generous to those in straitened circumstances, and he gave liberally, in skilled attention and in other ways, to the members of the Limbless Soldiers' Association, of which he was one, to the wards of "Legacy", and to charges of the Crippled Children's Association.

He was a nature-lover, and spent many a lunch hour wandering through the Botanical Gardens and many a week-end and holiday in the bush behind the coastal towns from the Tweed River to Mount Coolum, studying wild flowers in particular; and great was his enthusiasm when he found a flower of some rare species. He also spent many a holiday in the far west at the home of his eldest daughter, Mrs. Tully, where the fauna and flora are so different from those in the coastal region. He was proud to display the flowers grown in his garden. I once remarked: "You must spend much time working in your garden." He replied: "No, I do no gardening. I think it would spoil my appreciation of the flowers if I had to care for them myself." I thought that this reply was an ingenious one, but so far I have not ventured to express such an opinion with regard to my own garden.

Arthur Meehan had musical tastes and was fond of the stage; he regularly attended the theatre and the Australian Broadcasting Commission's concerts in the Brisbane City Hall.

He was a deeply religious man and shunned anything which was dishonourable or in bad taste.

He had a great sense of humour. One story he told me many years ago I remember well. A senior Brisbane physician had a patient with symptoms that puzzled him, and the patient later sought a further opinion from a surgeon, who advised an operation. The physician strongly advised against the operation, but the surgeon had his way and the operation was performed. The physician called at the hospital to see the patient and was met by a sister with a pronounced Irish brogue. On inquiry, he was told that the patient was dead. Said the physician with ill-concealed annoyance: "And what does Dr. ——— [the surgeon] think now?" "Oh", said the sister, "he thinks he's dead too!"

Arthur Meehan was a man of great determination, and this was borne out in many ways, particularly in the way he faced the consequences of the loss of a leg in World War I. He never mentioned it, he refused to regard it as a handicap, and few knew of his infirmity, for he played tennis well; he swam daily in his swimming pool or in the surf when at the seaside.

He was well known for his justness. In his deliberations when making recommendations for various appointments, he always considered every aspect of the proposition and did his best to make his decisions fair. Personal considerations did not influence him.

He was generous in his opinion of others. Miss A. Walsh, who acted as his consulting room nurse for many years, remarked one day that she had never heard him speak ill of anyone. I can bear similar testimony.

He was devoted to his family. He loved his home. One of his great delights was to be with his grandchildren, who often accompanied him on his excursions through the countryside.

Arthur Meehan's demise is a great loss to me. Our friendship was a long one. He was loyal and true. I owe much to him, not only for his friendship but also for his helpful advice in days gone by and the willingness with which he attended members of my family on many occasions and sometimes in emergency. He treated them as though they were his best patients. I believe all his patients shared this feeling.

ANDREW RUSSELL MURRAY.

Dr. Donald Watson has sent the following appreciation of the late Dr. Andrew Russell Murray.

Andrew Russell Murray was born in Tasmania in 1910, and educated in Melbourne at Scotch College and at Ormond College in the University of Melbourne.

His family was an unusually closely knit and happy one, and his childhood, which would otherwise have been more than ordinarily fortunate, was marred by two serious accidents which resulted in the loss of one leg and in an ulnar nerve palsy—two disabilities which might well have

proved disastrous to one of a less resolute spirit. He adapted himself to these very rapidly, and certainly by the time he reached Ormond College he made no apparent concessions to them whatever. His contemporaries well recall his performances at cricket—two astonishing stumpings in one innings, against Queens, remain vividly in the writer's mind as well as some substantial performances with the bat. Generally he savoured university life to the full until his graduation in 1936.

Academically he matured late; and while his unusual potential was apparent to his contemporaries, it was not until he reached Edinburgh, after his resident term at the Alfred Hospital, that his performance began to match his ability.

There, after rejection for military service, he worked, with appointments at the Royal Infirmary and at Leith, mainly in general surgery but tending to orthopædics and in particular the surgery of the hand. A deal of his work on hands was done at Leith, where he started a hand clinic, and the great skill he developed is well shown in his

publication on reconstructive surgery of the hand in 1945, where he reports, among other things, successful transposition of the index finger to replace the lost thumb.

At the end of the war he fell an undeserving victim to the generally sound principle of preference to servicemen, and, being left without a suitable appointment, after a period at the Oldham Infirmary returned to Australia, coming to Brisbane in 1948.

Apart from his exceptional ability and sound training, he brought here his great knowledge of hand surgery and a great enthusiasm for clinical investigation, both badly needed locally. So Brisbane gave him scope, and he used this to the full, rapidly establishing himself among the leaders in his speciality.

He was a sound clinician and a brilliant operator—quick and precise—but it was as an investigator that he was at his best. His investigations into a wide range of orthopædic subjects were thoughtfully planned, meticulously executed and carefully annotated, and his lucid expositions of his results ensured a wide dissemination of the findings.

There was in his surgical thinking a vein of originality, already tapped, which might well in time have proved very rich—for the truly productive phase of his career had barely begun.

Murray was deeply interested in trying to establish a sound rehabilitation service, a cause he advanced with great vigour. A substantial share of the credit for the recently established School for Occupational Therapists at the University of Queensland and the proposed School for Social Workers must go to him.

Murray's dominant, and most admirable, characteristic was a constant search for perfection, a product perhaps of his sturdy independence and his challenging response to difficulties and disappointments, of which he had had more than his share. As a result he drove himself very hard, and though never robust and often in pain, he managed to perform a prodigious amount of work. Somehow, in spite of this, he preserved and indulged his interests outside medicine in subjects as diverse as music and woodworking.

He was a great surgeon, a fine friend, an excellent teacher, a stimulating companion and a staunch team man. He will in consequence be sorely missed by a very wide circle—by his many patients, by his juniors, who idolized him, by his colleagues, who were sustained by his strength and stimulated by his enthusiasms, and by his many friends, who held him in great affection.

He married in 1947 Miss Gertrude Cookson, of Manchester, a lady of great personal charm, whose gifts of understanding and friendship ensured for him and for their three young children a very happy home life. There is some solace in the thought that at the end he was soundly established in his profession, secure in his friends and happy in his family.

GEOFFREY HOWARD BARHAM BLACK.

DR. R. L. THOROLD GRANT has prepared the following appreciation of the late Dr. Geoffrey Howard Barham Black.

Geoffrey Howard Barham Black was born on September 14, 1893, at Burnside, South Australia. He was the only son of Alfred Barham Black an architect by profession, and Jessie Howard Black (*née* Howard Clark), whose father, John Howard Clark, was joint proprietor of *The Register*. On his father's side he claimed descent from the Reverend Richard Harris Barham, author of "The Ingoldsby Legends". His ancestry can be traced back to the days of William the Conqueror. On his mother's side his ancestry can be traced back to a Huguenot family who fled to Birmingham from France after the revocation of the Edict of Nantes and subsequently married into the Clark family.

Geoffrey Black obtained his early education at Mrs. Hübbe's private school at Knightsbridge and subsequently entered Saint Peter's College in 1905. From the latter school he won a university bursary in 1911; he commenced his medical course at the University of Adelaide in 1912 and graduated as M.B., B.S. in 1916 after a course shortened for war needs by curtailment of vacations. During the undergraduate period of his life he had taken a full part in student activities. He obtained a blue for rifle shooting. He played cricket and lacrosse, and he also rowed.

Immediately after graduation he enlisted in the Australian Imperial Force and served with the Australian Army Medical Corps on the western front with the rank of captain. He was gassed during his service and recuperated at hospital in Rouen. After demobilization he undertook post-graduate study in London and subsequently obtained an appointment as house physician at the Queen's Hospital, Birmingham.

He returned to Australia in December, 1919, and was appointed house surgeon at the Adelaide Children's Hospital in 1920. In 1921 he started in general practice at Snowtown, where he stayed until 1923. He then transferred to a general practice at Hindmarsh, an industrial suburb, and worked there until 1930.

Having decided to study ophthalmology as a specialty he went to England in 1930 and worked at the Royal London Ophthalmic Hospital and at Saint Bartholomew's Hospital until late in 1931. During some of this period he worked as a house surgeon at the Bristol Eye Hospital. He obtained

the Diploma in Ophthalmic Medicine and Surgery of the Royal Colleges in 1931 and returned to Adelaide in 1932, when he joined the late Dr. John Muirhead in an ophthalmic practice on North Terrace. After Dr. Muirhead's death he joined the late Dr. Brian Moore, and after Dr. Moore's death he carried on the practice and worked to the day of his final illness.

The list of his honorary appointments is formidable: honorary anæsthetist to Adelaide Children's Hospital, 1928-1930; honorary assistant ophthalmologist to Adelaide Children's Hospital, 1932-1943; honorary ophthalmologist to Adelaide Children's Hospital, 1943-1950; honorary consulting ophthalmologist to Adelaide Children's Hospital, 1950; honorary clinical assistant to ophthalmological section of Royal Adelaide Hospital, 1933-1937; honorary assistant ophthalmologist to Royal Adelaide Hospital, 1937-1948; honorary ophthalmologist to Royal Adelaide Hospital, 1948-1953; honorary consulting ophthalmologist to Royal Adelaide Hospital, 1953. He acted as honorary ophthalmologist to the Queen Victoria Maternity Hospital, to Mareeba Babies' Hospital, to Townsend House for blind children, to The Royal Institution for the Blind, to The Walkerville Church of England Boys' Home and to the House of Mercy at Walkerville. He served as a member of the Council of the South Australian Branch of the British Medical Association from 1926 to 1928. He was a member of the original Ophthalmological Society of Australia (British Medical Association) from its inception until his death; he served for many years as a councillor on this body. He was admitted to Fellowship of the Royal Australasian College of Surgeons in Ophthalmology in 1934.

Between the two world wars he served in the Australian Military Forces, and at the outbreak of the second war he was in command of the Third Australian Field Ambulance. Owing to a disability resulting from service in World War I, he was not accepted for overseas service. He served as ophthalmic surgeon to the Australian Military Hospital at Springbank. For part of his service time he was acting Deputy Director of Medical Services at Keswick Barracks.

Subsequent to the death of Dr. Brian Moore, Dr. Black acted as one of the ophthalmic consultants in the investigation on rubella and congenital malformations conducted by

Dr. Charles Swan in South Australia during the years 1942 to 1946 under the ægis of the National Health and Medical Research Council. His name appears as a co-author in three of the six published papers (see THE MEDICAL JOURNAL OF AUSTRALIA, 1943, 2: 201; 1944, 1: 409; and 1946, 2: 889) which embodied the results of the inquiry. Dr. Black amplified Sir Norman Gregg's clinical description of rubella cataract. Later, he was the first to describe the transformation of such cataracts through the Morgagnian stage to the membranous type of cataract.

At this stage of the recital of his achievements I pause and wonder whether I, a very old personal friend, had a complete appreciation of what he had done for the community. I am quite certain that the general public is quite unaware of most of what has been done on their behalf by this busy man. What manner of man was he?

He was a good and loyal friend; he had a sense of humour, and he never was uninteresting. He was highly intelligent; he had a very strong sense of moral and ethical values. Anything which was perhaps not quite straightforward infuriated him. He disliked fools, upstarts and humbugs, and did not hesitate to let them see what his feelings were towards them. He was quick to anger; so, strange to relate, were some of his closest friends and colleagues, but they always got along together splendidly; they seemed to neutralize one another. He was most conscientious about his work and about his treatment of his junior colleagues: it was not for him to leave early so that others might finish the work, nor would he be late in arriving. As a consulting colleague he was ideal, and he will be sadly missed in this field.

He was a superb craftsman, possessing unique ability as a cabinetmaker and french polisher. His latest venture had been to build with the aid of his sons and their friends a holiday house at Port Willunga. This had been almost completed at his death.

In 1925 he married Catherine, daughter of Mrs. Gilmore Reid and the late John Howard Reid. They had two daughters and three sons. The younger daughter graduated in medicine in 1950. The youngest sons (twins) are to enter the medical School in Adelaide this year. A visit to the Black home was something always to be enjoyed and remembered; it can be readily understood why their house was frequently full of friends. Standing out vividly in my memory is the occasion of a daughter's wedding with the gathering of very old friends enjoying gracious hospitality.

He died, as he would have wished, in full work. On the day of his last illness I had walked down the street with him to lunch, and we had discussed what we might be doing in our old age. That evening without warning he was stricken, and he died a few days later on January 13, 1956.

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ROBERT GROSSLICHT.

THE following appreciation of the late Dr. Robert Grosslicht has been sent by Dr. Francis Ofner.

When I first met Robert Grosslicht eight years ago, he was one of those many victims of our era who, as alien travellers, wander in foreign lands to seek shelter and refuge. His was a complex personality. By temperament and nature, he was an artist and gifted musician, a singer of no mean quality, who, in hours of depression or sorrow, found relief in songs and harmonies. By training and skill, he became a physician *par excellence*, a keen diagnostician who had a remarkable ability to analyse and appraise his patients and to appreciate fully each symptom as a derivative of their psychosomatic background. He saw the parts and never lost sight of the whole. He was loved by his patients, who clung to him, and in many instances followed him from continent to continent. By mental attitude and outlook, he acquired a humane stoicism in the noblest sense. From his earliest youth he achieved, by personal effort and energy, successes and results, but ever found them thwarted

DISEASES NOTIFIED IN EACH STATE AND TERRITORY OF AUSTRALIA FOR THE WEEK ENDED FEBRUARY 18, 1956.[1]

Disease.	New South Wales.	Victoria.	Queensland.	South Australia.	Western Australia.	Tasmania.	Northern Territory.	Australian Capital Territory.	Australia.
Acute Rheumatism	8(2)	3(3)	4(1)	..	2(1)	..	..	..	17
Amœbiasis	..	..	..	..	1	..	..	..	1
Ancylostomiasis	2	..	..	..	..	..	..	..	2
Anthrax	..	..	..	..	..	..	..	..	..
Bilharziasis	..	..	..	..	..	..	..	..	..
Brucellosis	..	..	..	..	..	..	..	..	..
Cholera	..	..	..	..	..	..	..	..	..
Chorea (St. Vitus)	..	..	..	..	..	..	..	..	..
Dengue	..	..	..	..	..	..	..	..	..
Diarrhœa (Infantile)	13(8)	21(17)	2(1)	..	..	..	..	..	36
Diphtheria	2	2(2)	..	..	1	..	..	..	5
Dysentery (Bacillary)	..	..	4(3)	..	2(2)	..	..	..	6
Encephalitis	2(1)	..	..	1(1)	..	..	..	..	3
Filariasis	..	..	..	..	..	..	..	..	..
Homologous Serum Jaundice	..	..	..	..	..	..	..	..	..
Hydatid	..	..	..	..	..	..	..	..	..
Infective Hepatitis	193(102)	115(42)	..	40(15)	4(3)	..	1	..	353
Lead Poisoning	..	..	..	..	..	..	..	..	..
Leprosy	..	..	..	..	..	..	..	..	..
Leptospirosis	..	..	..	..	..	..	..	..	..
Malaria	..	..	1	..	..	..	..	..	1
Meningococcal Infection	2(1)	..	..	..	..	1	..	..	3
Ophthalmia	..	..	..	..	..	..	..	..	..
Ornithosis	..	..	..	..	..	..	..	..	..
Paratyphoid	..	..	..	..	..	..	..	..	..
Plague	..	..	..	..	..	..	..	..	..
Poliomyelitis	4	6(3)	3(2)	3(2)	36(21)	..	..	2	54
Puerperal Fever	..	1	..	..	..	..	..	..	1
Rubella	..	37(23)	1	3	1(1)	..	..	..	42
Salmonella Infection	..	..	..	..	..	..	..	..	..
Scarlet Fever	13(8)	6(5)	2	7	..	..	..	..	28
Smallpox	..	..	..	..	..	..	..	..	..
Tetanus	..	..	1	..	1	..	..	..	2
Trachoma	..	..	..	..	17(15)	..	..	..	17
Trichinosis	..	..	..	..	..	..	..	..	..
Tuberculosis	73(36)	22(16)	15(5)	6(5)	13(11)	3(1)	..	..	132
Typhoid Fever	1(1)	..	..	..	..	..	..	..	1
Typhus (Flea-, Mite- and Tick-borne)	..	..	..	..	..	..	..	..	..
Typhus (Louse-borne)	..	..	..	..	..	..	..	..	..
Yellow Fever	..	..	..	..	..	..	..	..	..

[1] Figures in parentheses are those for the metropolitan area.

by the doom of an incongruous Nemesis. He accepted this fate with equanimity and resignation, yet never became bitter—only mellow. Instead of sterile misanthropy he adopted humanistic philosophy.

Medicine, music and humanism—these were the three hinges on which Dr. Grosslicht's life was turning. This triad was a familiar one to his background and tradition. Born in Vienna in 1914 and educated there spiritually, culturally and medically, he became imbued with the artistic values, scientific knowledge and philosophic ideas of that city at a time when the setting rays of an old culture were still shining over it.

As a young doctor appointed to the hospital services of Vienna, he had to leave his post and country, driven out by hatred and dark forces. He found refuge in Shanghai, where, after a further period of fruitful hospital work, he managed to build up a successful private practice. His achievement was thwarted again, this time by the invasion of the Japanese and later by the change of regime in China.

With a family by then, he sought a more amicable atmosphere in Sydney. When faced with the strict rules of local registration, he viewed them exclusively as a challenge to be met and never as an obstacle before which to surrender. Although physically weakened and economically handicapped, he purposefully strove towards his aim—to settle in Sydney, to provide for his family and to work in his cherished profession. He succeeded again admirably—alas, for a short time only. The task of overcoming all these hurdles and the strain of surmounting every handicap without sacrificing his principles, with a "stiff lip" so well known to his country of adoption, proved to be too much for his weary heart.

He will be grievously missed by his numerous patients, friends, relatives, wife and son.

AN HONOUR FOR DR. JOHN G. HUNTER.

AT its meeting at Hobart on March 1, 1956, the Federal Council of the British Medical Association in Australia awarded its Gold Medal for distinguished service to Dr. John G. Hunter, its General Secretary. We offer our warm congratulations to Dr. Hunter.

Public Health.

IMMUNIZATION BY SALK TYPE VACCINE.

THE following statement was issued by the Federal Council of the British Medical Association in Australia at its recent meeting in Hobart to State Branch Councils for circulation to members.

The Commonwealth Health Department, with the cooperation of the State Health Departments, is arranging a plan of immunization against poliomyelitis.

Doctors are receiving inquiries from parents concerning the advisability of consenting to this immunization for their children.

The Federal Council of the British Medical Association in Australia strongly supports the principle of this type of vaccination as its offers protection against the paralytic effects of infection by the poliomyelitis virus.

The Federal Minister for Health (Dr. Donald Cameron) has assured the Federal Council of the meticulous care which is being taken in the preparation and checking of the vaccine in the process of its manufacture. Provisions have also been made for a very stringent second check by a strong independent committee of experts to ensure the absolute safety of the product before it is released for use.

For these reasons the Federal Council recommends to the members of the profession throughout the Commonwealth that they enthusiastically support the forthcoming campaign.

Nominations and Elections.

THE undermentioned have applied for election as members of the New South Wales Branch of the British Medical Association:

Harris, Leon Eugene, M.B., B.S., 1954 (Univ. Sydney), 11 Yosefa Avenue, Warrawee, New South Wales.

Ng, Hein Wah Francis, M.B., B.S., 1955 (Univ. Sydney), Mater Misericordiæ Hospital, Crow's Nest, New South Wales.

Lloyd, Alan Murray, M.B., B.S., 1955 (Univ. Sydney), 1/357 Alfred Street, North Sydney.

Mitchell, Henry James, M.B., B.S., 1954 (Univ. Sydney), 191 Grafton Street, Bondi Junction, New South Wales.

The undermentioned has applied for election as a member of the Victorian Branch of the British Medical Association:

Chick, John Bertram, M.B., B.S., 1955 (Univ. Adelaide), Base Hospital, Mildura, Victoria.

Deaths.

THE following deaths have been announced:

HAYES.—Joseph Oliver Plunket Hayes, on November 19, 1955, at Alice Springs, Northern Territory.

NORTHCOTT.—Charles Henry Northcott, on February 29, 1956, at Northbridge, New South Wales.

Diary for the Month.

MARCH 13.—New South Wales Branch, B.M.A.: Ethics Committee.

MARCH 15.—New South Wales Branch, B.M.A.: Clinical Meeting.

MARCH 17.—Western Australian Branch, B.M.A.: Annual General Meeting.

MARCH 19.—Victorian Branch, B.M.A.: Finance Subcommittee.

Medical Appointments: Important Notice.

MEDICAL PRACTITIONERS are requested not to apply for any appointment mentioned below without having first communicated with the Honorary Secretary of the Branch concerned, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

New South Wales Branch (Medical Secretary, 135 Macquarie Street, Sydney): All contract practice appointments in New South Wales.

Queensland Branch (Honorary Secretary, B.M.A. House, 225 Wickham Terrace, Brisbane, B17): Bundaberg Medical Institute. Members accepting LODGE appointments and those desiring to accept appointments to any COUNTRY HOSPITAL or position outside Australia are advised, in their own interests, to submit a copy of their Agreement to the Council before signing.

South Australian Branch (Honorary Secretary, 80 Brougham Place, North Adelaide): All contract practice appointments in South Australia.

Western Australian Branch (Honorary Secretary, 8 King's Park, West Perth): Norseman Hospital; all contract practice appointments in Western Australia. All government appointments with the exception of those of the Department of Public Health.

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